NETOP™

PrintLimit™ PRO

Print Management Software

User's Guide

Version 11.4

Netop

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Preface

1. About This Guide

PrintLimit™ PRO Netop

The Print-Limit Pro User Guide covers the setup, management and configuration of Print-Limit Pro.

For information regarding how to configure and install Print-Limit Pro, see the Quick Start Guide in Chapter 4, *Quick Tour*, and the accompanying sections like Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers*. Prior to installing the application please take a few moments to read key sections of this manual. In addition, people new to print control may also find the accompanying implementation guide available from the Netop website useful in managing the deployment process.

The latest version of this manual in HTML and a printable PDF format are available from the Netop website at http://www.netop.com/printlimit_pro.

2. Expectations & Prerequisites

Print-Limit Pro is a network based server application. Experience with basic network concepts such as server administration and network connectivity is expected. Prior to installing or evaluating Print-Limit Pro you should be familiar with:

- The concept of sharing printers and print servers
- Understanding of client-server relationships
- Understanding of basic security concepts such as permissions, groups and users.

3. Terminology used in this document

To make reading this manual easier, the names of all of the screens, tabs and actions from Print-Limit Pro are marked up in a different font. The **User Details screen** for instance.

A sub-screen or tab is indicated with an arrow. **User Details** → **Adjustments** means: select *Adjustments & Charges* tab from the *User Details* screen.

User Interface Buttons are indicated like this: Press **OK** to continue.

System output and keyboard input is indicated with a `different` font as well.

Field labels are indicated like this **Username**.

Important

Important notes are marked like this.

Tip

Tips provide useful advice to make your life easier.

Caution

Indicate situations where you have to be careful what you are doing.

Warning

Where extreme care has to be taken.

4. Notice

While *every* effort has been taken to ensure the accuracy and usefulness of this guide, we cannot be held responsible for the occasional inaccuracy or typographical error. If you do find an error, please let the Netop Development Team know.

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Chapter 1. Introduction

1.1. What is Print-Limit Pro?

PrintLimit™ PRO Netop

Print-Limit Pro is a comprehensive print management system designed to seemlessly monitor and control your resources with easy to use administrative and user tools that can be securely accessed from anywhere on the network though a web browser.

Print management requirements vary from organization to organization, and often change dramatically within an organzation over time. Print-Limit Pro is designed for flexibility and scalability and can be configured to meet your print management needs now and in the future. It is used in a wide variety of environments ranging from universities with large printer fleets supporting over 100,000 users to smaller organizations that track printing for a fewer than 50 users on 3 or 4 printers. You can implement a basic system within a few minutes, or if you need more than simple monitoring and reporting, you can configure powerful features that include differential pricing, blocking filters and programatic control via APIs and scripting. No matter where you start, you can easily adjust parameters to implement changes as gradually or quickly as you wish.

Possible implementations can include:

- Silent activity monitoring
- Visible activity monitoring and expense tracking by work area, projects and departments
- Quota/allowance enforcement
- Charge per-print system
- Combinations of all of the above to accommodate various user / group profiles

In addition Print-Limit Pro provides system administrators with a kit of tools to manage printers including:

- Detailed logging and reporting
- Notifications for printer errors and low toner
- Job blocking filters and re-direction

1.1.1. Benefits

Some of the key benefits of Print-Limit Pro are:

- Transfers accountability to users or departments by individually tracking activity.
- Creates environmental awareness by drawing users' attention to the impact of their specific usage.
- Reduces overall printing cost through job filtering, enforcing flexible quotas, or direct cost recovery.
- Discourages overuse of IT resources by establishing a managed print environment.
- Improves efficiency by allowing administrators to create rules that can steer printing to designated printers for load balancing, to implement 'Find Me' printing, or to redirect print jobs based on criteria defined using advanced scripting tools.
- Improves network reliability by implementing rules to prevent printer queue jams, queue hogging, and inappropriate printing types.

1.1.2. Key Features

Some of the key features of Print-Limit Pro are:

- Track all printing activity by user, client account, printer and document metadata.
- Enforce per user quotas, or group account budgets
- Differential print cost/charging allowing costs to be assigned on a per printer basis with advanced options to charge different amounts based on document type (e.g. color, grayscale or duplex), page size, user or group.
- Hardware neutral solution supports all major printer types and operating systems. No hardware vendor lock-in!
- Both cross-platform and multi-platform support. Run a mix of Windows and/or Linux print servers and support clients ranging from Windows, Mac, Linux, Unix and Novell OES.
- User Web Tools allow end-users to track usage, transfer funds, request refunds and upload documents from unauthenticated (wireless) laptops.
- Provides end-users with advanced options to allocate print jobs to shared accounts, cost centers, faculties or departments.
- Single sign-on user authentication with native Active Directory integration or synchronization with LDAP user accounts. (no separate passwords to manage!)
- Flexible hold/release queue support with Release Station software allowing administrators to implement management approved or secure user release printing environments.
- Service Oriented Architecture utilizing the latest software design methods including, test driven development, XML Web Services and layered architecture. This ensures scalability and stability by design.
- Advanced reporting and charts available in standard formats including PDF, Excel, and HTML. All reports accessible from anywhere on the network via a standard web browser.
- Ability to run on top of leading 3rd party Relational Database Management Systems (RDBMS) including Microsoft SQL Server, Oracle, MySQL and PostgreSQL Database.
- Enterprise level security and encryption based on SSL.
- Open architecture with a powerful scripting language, source code access and API documentation.

1.1.3. System Requirements

Print-Limit Pro supports the following *server* platforms:

- Microsoft Windows Server 2008 (any edition)
- Microsoft Windows Server 2003 (any edition)
- Microsoft Windows 2000 (Pro and Server)
- Microsoft Windows XP (Pro and Pro x64)
- Microsoft Windows Vista (any edition except Home editions)
- Microsoft Windows 7 (any edition except Home editions)
- Macintosh OS X 10.4 - 10.6 (e.g. Tiger, Leopard, Snow Leopard) (both PowerPC and Intel supported)
- Novell Open Enterprise Server 2 (OES2 SP1+)
- Most modern Linux operating systems including:
  - Red Hat Enterprise Linux (AS 3.0, ES 3.0, AS 4.0, ES 4.0)
  - Novell SuSE Linux (8.2, 9.0+)
  - Fedora Core
  - Debian (3.1+) and Ubuntu

  With print queues hosted via:
  - Samba based print queues
  - CUPS based print queues

Servers and clients must use user ID/username based authentication (e.g. Active Directory, Windows NT, LDAP, or

local system accounts).

Sites with more than 500 users should consider a server class system with more than 512MB of RAM and 500 MB of free disk space.

Print-Limit Pro supports approximately 90% of printers on the market. Where possible we recommend printers that support one of the two major printer language standards - Postscript or PCL.

On workstation clients:

- All supported Microsoft Windows platforms (Windows 95 and later)
- Macintosh OS X 10.3.9 or higher recommended
- Most modern Linux and Unix Operating Systems (Java 5.0+ required for optional client tool)

1.2. How does Print-Limit Pro work?

Before explaining how Print-Limit Pro works at a technical and end-user level, the reader should be familiar with the following key concepts.

1.2.1. Key Concepts

1.2.1.1. Print Server

A print server is a system responsible for hosting print queues and sharing printer resources to desktop clients/workstations. Users on the workstations submit print jobs to a print server rather then directly to the printer itself. A print server may be a dedicated server but on many networks this server may also perform other tasks such as file serving.

1.2.1.2. Print Queue

A print queue is first-in-first-out queue listing all jobs pending on a given printer.

1.2.1.3. User ID/Username

In a multi-user environment, users log on to a network or computer using a username and password. These are often managed by services such as Active Directory or LDAP. The username is known as the user's identity. Print-Limit Pro uses this identity to track printing.

1.2.1.4. Shared Account

A shared account is a Print-Limit Pro term used to represent an account (pool of funds or allocation group) accessible to multiple users. Accounts usually represent "work areas" and the term can be used interchangeably with terms such as Departments, Faculties, Projects, Clients, Client/Matter, or Cost Centers.

1.2.1.5. Client/Server Model

Client software is a small program that runs on each workstation and communicates with a server. The printing process on most networks works on a client/server model with clients (workstations) submitting jobs to a server. Print-Limit Pro also uses the client/server model in the optional client software to commumicate with end-users.

1.2.1.6. Application Server

An application server is a server program responsible for centrally processing “business logic” and providing services to end-users. Print-Limit Pro uses the application server model to provide a “business logic” unit for calculating user costs and providing a web browser interface to end-users.

1.2.1.7. Information Provider

A provider is a software component or program responsible for providing information to an Application Server. Print-Limit Pro uses providers to submit print queue/job information to its application server. This information

provider is called the *Print Provider*. Other important providers included with Print-Limit Pro include user directory and authentication providers.

1.2.1.8. Web Application Interface

A web application is a software program that interacts with end-users via a web browser. Examples range from Google, Microsoft SharePoint, Hotmail, Internet banking and router management consoles. Print-Limit Pro provides a web-based interface for system administration and management. Web applications offer administration flexibility by allowing access from any location on the network and avoid the need for installation of separate software.

1.2.1.9. Scripting Language

A scripting language is a programming language that allows control of one or more software applications. In Print-Limit Pro scripting can be used to perform various administrative functions such as modifying perameters for users, shared accounts or printers. It can also be used for programitic control during the print process to provide functionality such as print job re-direction, user notifications / warnings and confirmation for large or expensive print jobs.

1.2.1.10. Web Print Server

Web print server is the Print-Limit terminlogy for a server that allows laptop (wireless) users to upload Microsoft Office and PDF files to be printed on network printers from personal computers that are not authenticated to the network and do not have network printer drivers.

1.2.2. Understanding the print process flow

To help explain what Print-Limit Pro is and how it works we'll introduce the system by example. We'll start with a simple high school example:

The student's perspective (transparent quota control):

1. Chris is a student at a local high school. He has logged onto the network using his username, `chris.j.smith`, and is surfing the Internet. He selects Print from his web browser to print out a web page for his school assignment.
2. The network administrator has allocated Chris a printing credit budget of $20.00 a month. He can see his current account balance of $10.00 in the Print-Limit Client Tool window.

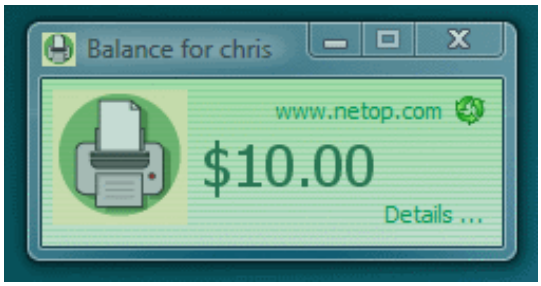


Figure 1.1. The user client tool

3. A confirmation screen listing the number of pages and the cost of the print job is displayed on the Worksation.
4. Chris confirms the print job.
5. 5 pages come out of the printer.
6. The network administrator has set a cost-per-page inside Print-Limit on the printer at $0.10. Chris' 5 page document costs $0.50.
7. Chris' account balance is now at $9.50. He may continue to print until he submits a print job that has a cost that is higher than the balance in his account.

The teacher's perspective (allocation to accounts):

1. Matt is a english and mathematics teacher at the same local high school.
2. Matt needs to print out a 279 page document for his next class.
3. The network administrator has configured Print-Limit to charge users in the faculty group $.01 per page, and has granted Matt access to charge to his personal account or to the english or math department's shared accounts.
4. Matt presses the **Print** button in the application.
5. The Print-Limit client tool displays a popup and presents Matt with information about the print jobs and requests an account selection. In this case accounts represent Departments but could also represent projects or other work areas.
6. Matt selects the english department's shared account from the list.

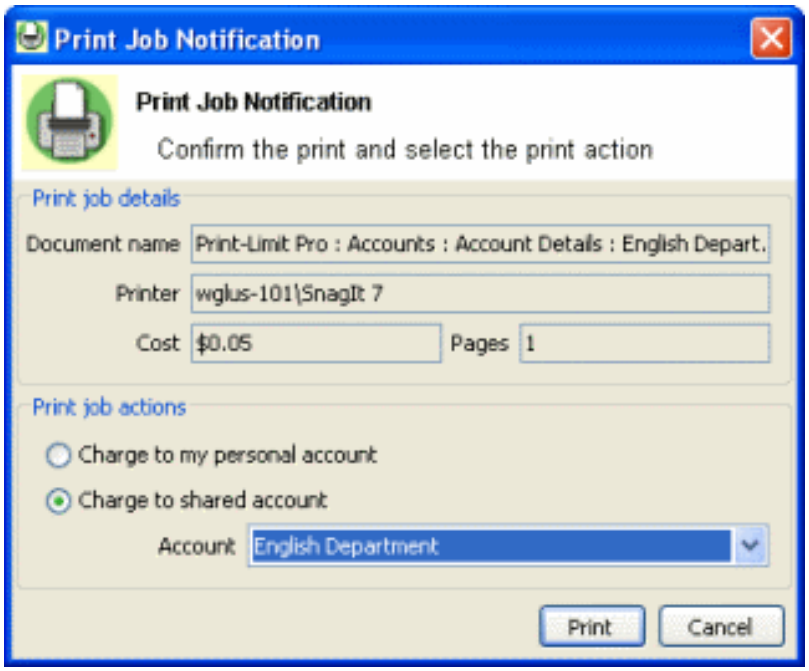


Figure 1.2. The User Client account selection popup

7. The print job is printed and the english department account is charged $2.97 for the print job.

The technical perspective (behind the scenes):

1. When the teacher, Matt, prints from his application, his workstation transfers the print job to the server and places it in the print queue.

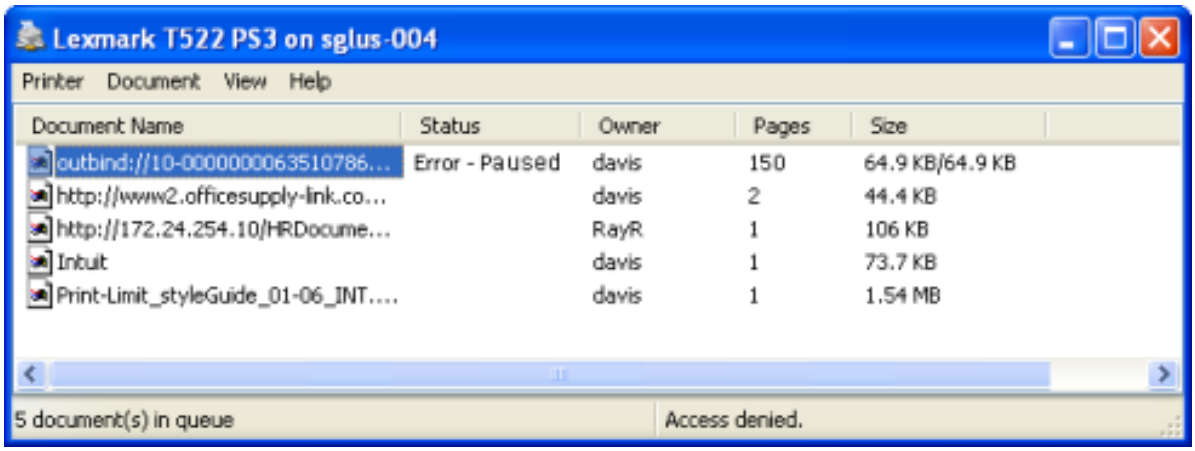

Lexmark T522 PS3 on sglus-004
Printer Document View Help
Document Name Status Owner Pages Size
outbind://10-0000000063510786... Error - Paused davis 150 64.9 KB/64.9 KB
http://www2.officesupply-link.co... davis 2 44.4 KB
http://172.24.254.10/HRDocume... RayR 1 106 KB
Intuit davis 1 73.7 KB
Print-Limit_styleGuide_01-06_INT.... davis 1 1.54 MB
5 document(s) in queue
Access denied.

Figure 1.3. The Windows print queue

2. The Print-Limit Print Provider intercepts the print job in the queue prior to printing, pauses it, and analyzes the information determining:
   a. Who printed the document
   b. The number of pages in the document
   c. Other information such as duplex, grayscale mode, paper size, etc.
3. The *Print Provider* submits the job's information to the *Application Server* to process the “business logic”.
4. The *Application Server* determines that Matt needs to select the account to charge. It notifies the *Client Software* on Matt's desktop.
5. The *Client Software* displays the Popup requesting for the user to select an account.
6. After Matt selects the account, the *Application Server* is notified of Matt selection. The “business logic” validates that Matt is authorized to charge to the selected account.
7. The *Application Server* charges the appropriate account, logs the job and instructs the *Print Provider* to resume or unpause the print job in the print queue allowing it to proceed to the printer.

1.2.3. Architecture Overview

Print-Limit Pro was developed using the latest software development strategies, a strong influence being Service Oriented Architecture (SOA). The *Print Provider*, *Application Server* and *Client Software* all communication uses XML based web services over HTTP.

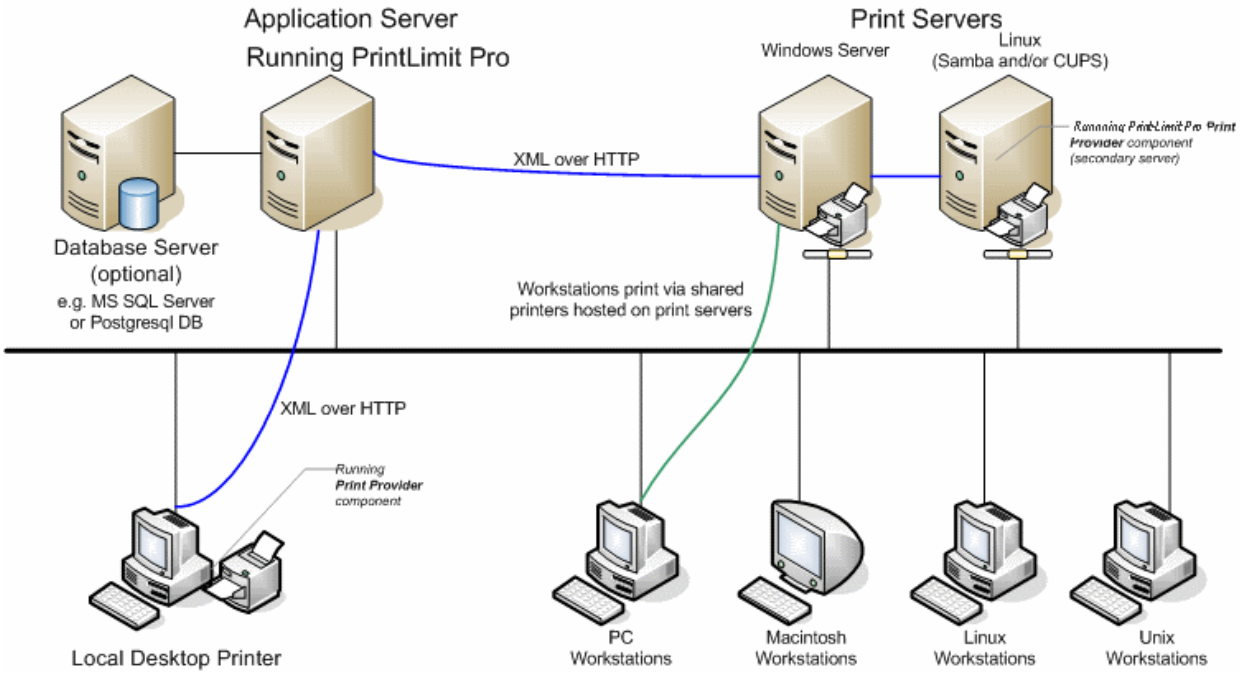


Figure 1.4. Print-Limit Pro Architecture - an advanced configuration

A more detailed explanation of the architecture and support for multiple servers, web print servers, server clustering, and payment gateways can be found in subsequent sections of this User Guide.

1.3. The Top-Ten Hidden Features!

PrintLimit™ PRO Netop

Much of Print-Limit Pro flexibility and usefulness comes not from the features you can see, but from the advanced hidden features. Print-Limit Pro is packed full of handy tools, utilities and options and you will read about these throughout this guide. To provide a quick overview now, the most popular hidden features are:

1.3.1. One: Zero-install Client Deployment

Print-Limit Pro is implemented using 100% server-side logic and no client software is required. A simple lightweight client tool is however provided so end-users have access to advanced features such as shared accounts and the option of viewing their account balance in a popup window.

Deploying client software can be a time consuming and fiddly process. To streamline the process Print-Limit Pro allows its client to be run directly off a network share - no need to install locally, or mess around with deployment tools! Just set the executable as a startup program and it will run and auto-update itself thereafter.

See Section 5.2, “User Client” for more information.

1.3.2. Two: Remote Administration

Print-Limit Pro is a 100% web based application. Full system administration can be performed from anywhere on the network via a standard web browser - no special admin software is required! To access the administration section, point a browser at the server on port 9191:

```
http://[server_name]:9191/admin
```

Encrypted SSL/HTTPS access is also available on port 9192:

```
https://[server_name]:9192/admin
```

Access is granted to the built-in `admin`, or to any user that has been granted administrator level access.

1.3.3. Three: Web Print

Web Print enables printing from user-owned devices without the overhead of installing printer drivers and managing workstation authentication to the server.

Microsost Office or Adobe PDF files are uploaded using the same User Web Tools available on network computers. Web Print is fully integrated into Print-Limit's standard print charging/accounting/quota process. It does not matter if you're a staff user allocating to a faculty or department account, or a student charging to your free print quota, the user account allocation experience the same as that seen when printing from a networked desktop system.

Print-Limit's Web Print has been deployed across hundreads of education campuses and is an ideal solution for offering print services via student owned laptops and netbooks.

See Chapter 19, *Web Print (Driver-less printing via a web browser)* for more information.

1.3.4. Four: Shared Accounts

Many organizations would like to track their printing on more than a per-user level. With the Shared Accounts feature, users can allocate jobs to cost areas such as Faculties, Departments, Projects, Clients, Cost Centers, or Pools. Shared accounts are selected via a customizable popup window. Two popup window types are available:

- *Standard* - A simple account selection window design ideal for most users.
- *Advanced* - An advanced account selection window designed for the power user including features such as search, preference list, recent selections, comment entry and invoicing options. This is ideal for businesses including Engineering, Law, Accounting and Architecture Firms.

Access to accounts is controlled via integrated network group membership or optionally PIN's.

See Chapter 8, *Shared Accounts* for more information.

1.3.5. Five: Secondary Servers and Local Printers

Print-Limit Pro is an enterprise level application designed to be managed and controlled from a central location. Multi-server environments are common in large organizations and Print-Limit Pro handles them with ease. All servers are configured to report back to the central *Application Server*. This ensures that all management, logging and control is centralized. Secondary servers and workstations with local printers simply run a light weight monitoring component that communicates to the central server via XML Web Services calls.

Servers and workstations can run the seconary server software on any supported operating system no matter what operating system is used on the Application Server because Print-Limit Pro supports mixed or heterogeneous networks as well!

See Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers* for more information.

1.3.6. Six: Scripting

Scripting can be applied on a per printer basis to provide programatic control during the print process. Possible applications include:

- Route the job to the cheapest compatible printer and notify the user of the change (least-cost routing)
- Prompt users to print large color jobs on a compatible low cost grayscale printer
- Charge printing during class time to the department

- Inform user when printer is in error and suggest a compatible alternative

See Chapter 16, *Advanced Scripting (Print Scripting)* for more information.

1.3.7. Seven: Customizable Web Interface

Did you know that the end-user interface can be quickly customized to make it look like an official part of your organization's infrastructure? With some simple HTML, you can make the Print-Limit Pro end-user interface look just like your existing web site or intranet site.

See Section 15.3, “Customizing the User web pages” for more information.

1.3.8. Eight: XML Web Services and Command-line Control

It seems like everything these days is Web Services enabled. Not to be outdone, Print-Limit Pro exposes dozens of API's via secured XML Web Services. This provides advanced administrators and developers with the ability to programmatically remotely control, integrate and manage the application. The possibilities are endless... some of our users now have their library fines hooked into the Print-Limit Pro system!

In addition to the Web Services API's, system administrators may hook into the inner workings of Print-Limit Pro using server commands and scripting.

With server commands you can use batch files or scripts to automate system functions such as:

- Schedule "online" backups to coordinate with your existing backup processes. No need to take the system down to take a data snapshot.
- Create users in Print-Limit Pro automatically and as part of your existing user creation scripts.
- Automatically import/sync list of accounts from a file, 3rd party system or existing directory structure. (Great for Engineering and Architecture firms)

See Section A.3, “The XML Web Services API” and Section A.1, “Server Commands (server-command)” for more information.

1.3.9. Nine: 3rd Party Database Support

Print-Limit Pro ships with its own preconfigured and self-maintaining database. The system however is database independent and can be run on top of a number of leading database systems. Maybe you have an existing Microsoft SQL Cluster and would like to take advantages of this infrastructure. No problem! Print-Limit Pro can be quickly configured to hook into your preferred database.

See Chapter 18, *Deployment on an External Database (RDBMS)* for more information.

1.3.10. Ten: The Development Team

Software is only as good as the development process. Print-Limit Pro is developed in an open and transparent fashion by a small development team. The team works closely with key system users to architect new features. Suggestions and feedback is encouraged. Please contact us if you have any good ideas!

Chapter 2. Installation

This chapter covers the initial installation and configuration of Print-Limit Pro in your network environment. Initial installation takes only a few minutes on a currently configured server. This guide will walk you through installation and configuration step-by-step. The process is summarized below:

1. System requirements check
2. Downloading and installing Print-Limit Pro
3. Completing the configuration wizard
4. Testing client software
5. Testing printing and remote access

Print-Limit Pro is a cross-platform solution and the installation procedure will vary depending on the target operating system(s). Please jump to the appropriate section below:

- Windows: Section 2.1, “Installation on Windows”
- Mac: Section 2.2, “Installation on Apple Mac”
- Novell: Section 2.3, “Installation on Novell OES Linux (iPrint)”
- Linux: Section 2.4, “Installation on Linux (CUPS and/or Samba)”

2.1. Installation on Windows

Important

This guide assumes that you are using Windows Server 2003. The process is similar for other Windows operating systems such as XP, Server 2008 or Vista.

If you're upgrading from a previous Print-Limit Pro version, please refer to the directions outlined in Appendix E, *Upgrading From a Previous Version*.

2.1.1. Step 1 - System Requirements & Network Setup

Before installing Print-Limit Pro for either evaluation or production use, the system administrator should take a few minutes to verify system requirements.

- Is the operating system version supported and patches up-to-date? Take a few minutes to verify the system is current and supported (see Section 1.1.3, “System Requirements”).
- In workgroup environments (i.e. where no domain is present), some additional configuration may be required. For more details see Chapter 24, *Running in a Workgroup Environment*.
- Are printer(s) installed and hosted on this system? Print-Limit Pro needs to be installed on the system directly hosting the printer(s). The printer should be installed as a "Local Printer" with a connection method such as TCP/IP Port, LPR, or JetDirect or directly connected to the system via USB or LPT Port.
- In a multi-user environment, printers are often shared with other network users. Other workstations should connect to these printers as "Network Printers". Ensure workstations are configured to print to the shared print queues. For example a Windows workstation may connect to a printer via a path like: `\\[samba_server]\[printer]`.
- Ensure that printers are configured correctly and work *before* installing Print-Limit Pro.

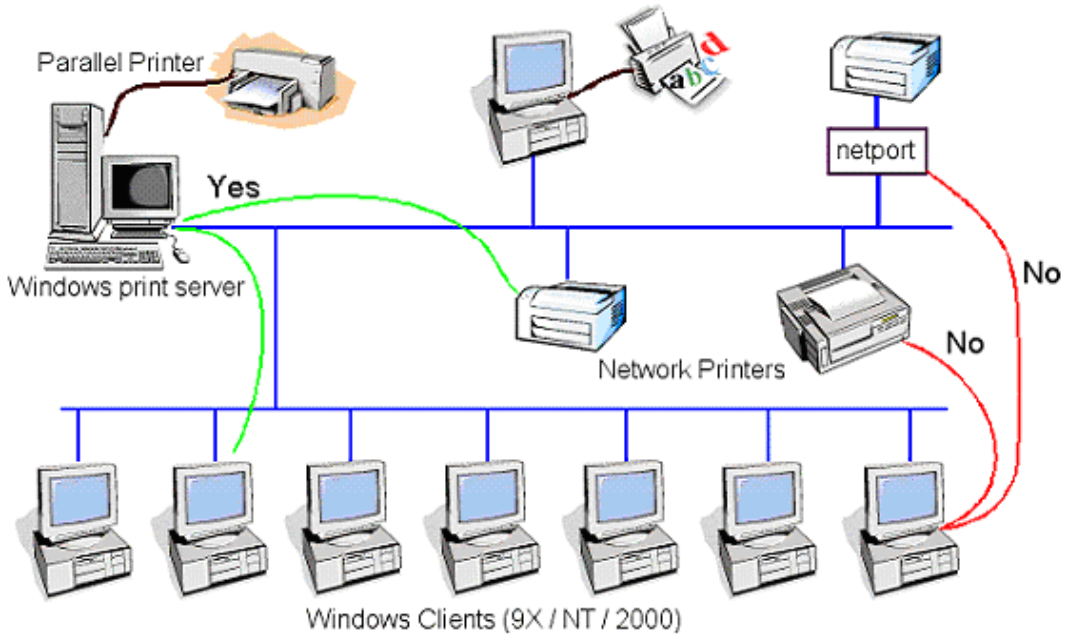


Figure 2.1. Network printer configuration

Important

If you are running the Print-Limit Pro server on Windows XP (Professional) you must disable "Simple file sharing". For more information please see Appendix B, *Troubleshooting & Technical FAQ's*.

If you are running a Windows workgroup network or using Windows XP/Vista Home workstations, please see Chapter 24, *Running in a Workgroup Environment*.

2.1.2. Step 2 - Print queue configuration

When using release stations or account selection popups it is recommended to secure the print queue so that users do not have permission to pause/resume documents in the queue. This allows Print-Limit Pro to have full control of documents without interference from users. To do this:

1. Log onto the server hosting the printers as an Administrator.
2. Open the printer configuration screen: **Start** → **Printers**
3. Right-click a printer and select **Properties**.
4. Select the **Security** tab.
5. Select the **CREATOR OWNER** user and uncheck the **Manage Documents** permission. See Figure 2.2, “Configuring Windows print queue permissions”
6. Press the **OK** button.
7. Perform these steps for each of the monitored printers.

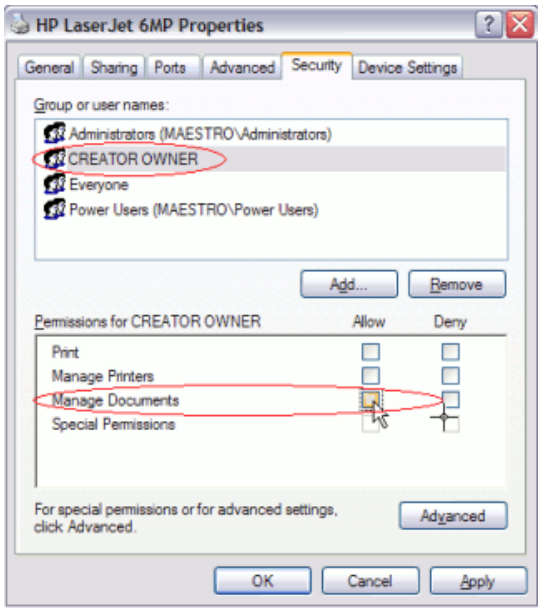


Figure 2.2. Configuring Windows print queue permissions

2.1.2.1. Windows Server 2008 R2 only

Windows Server 2008 R2 installations may experience an issue where print jobs are not removed from the print queue when completed. These jobs stay in the queue with a status of 'Sent to Printer'. To work around this you will need to configure the Printer Driver Isolation so that jobs are removed from the queue when completed.

1. Log onto the server hosting the printers as an Administrator.
2. Using the Server Manager, navigate to the Print Management Console: **Server Manager** → **Roles** → **Print and Document Services** → **Print Management** → **Print Servers** → **PrintServerName** → **Drivers**
3. Right-click a printer driver and select **Set Driver Isolation** → **None**.
4. Perform these steps for each of the monitored printers drivers.

2.1.3. Step 3 - Download and install

Print-Limit Pro is supplied as a standard Windows `setup.exe` install program. The latest version may be downloaded from http://www.netop.com/printlimit_pro. After the download is complete, run the setup wizard as an administrator level user. A system restart is usually not required but administrators are advised to perform installation on live production systems during periods of low activity - for example, not during backup operations or other administration activities.

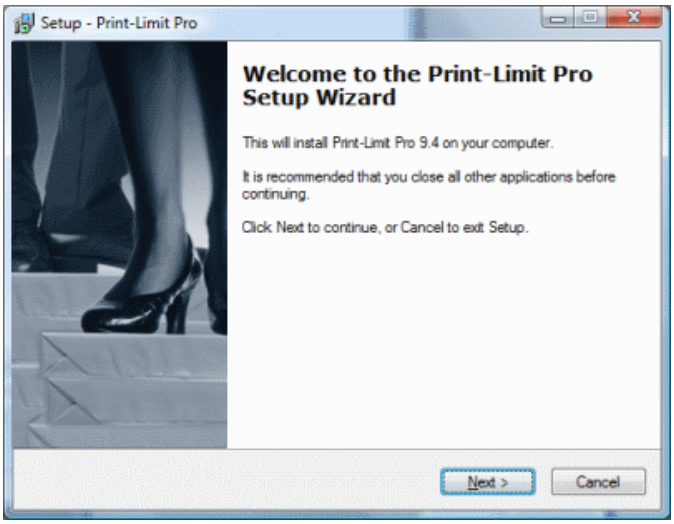

Setup - Print-Limit Pro
Welcome to the Print-Limit Pro Setup Wizard
This will install Print-Limit Pro 9.4 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

Figure 2.3. Setup wizard

Select the "standard install" option and install Print-Limit Pro onto a hard drive with adequate free disk space. The default options will suffice for most systems.

2.1.4. Step 4 - Configuration Wizard

After installation, the install will open a web browser window. The configuration stages are explained below:

2.1.4.1. Administrator Password

This is the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. Keep knowledge of this password secure! This screen also sets the system's physical location. Ensure the location and language setting are correct.

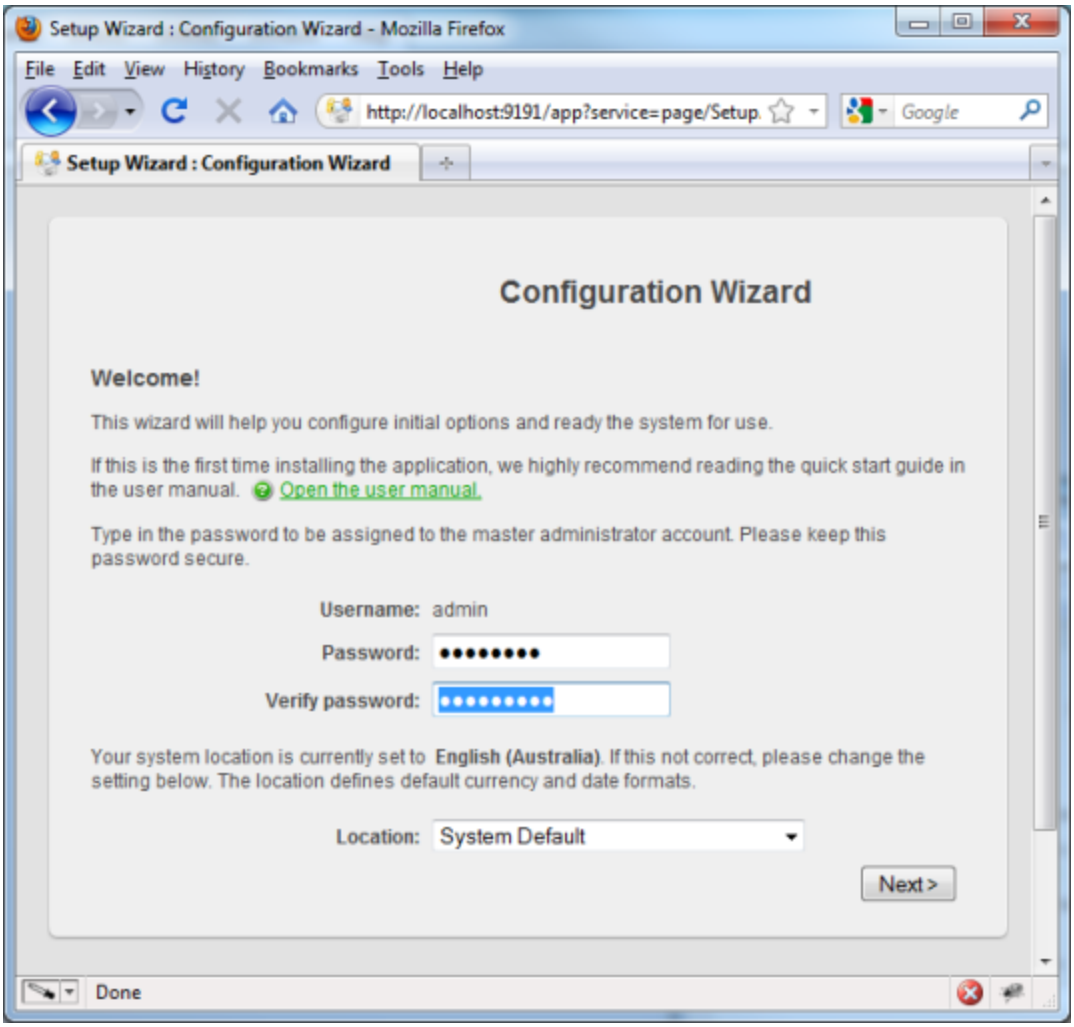

Setup Wizard : Configuration Wizard - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost:9191/app?service=page/Setup
Google
Setup Wizard : Configuration Wizard
Configuration Wizard
Welcome!
This wizard will help you configure initial options and ready the system for use.
If this is the first time installing the application, we highly recommend reading the quick start guide in the user manual. Open the user manual.
Type in the password to be assigned to the master administrator account. Please keep this password secure.
Username: admin
Password:
Verify password:
Your system location is currently set to English (Australia). If this not correct, please change the setting below. The location defines default currency and date formats.
Location: System Default
Next >
Done

Figure 2.4. Print-Limit Pro Configuration wizard

Tip

Treat this password like your router/modem management passwords. It is independent of your domain accounts and needs to be kept secure.

2.1.4.2. Organization Type

This is the organization type which matches the organizational environment where Print-Limit Pro will be used. Choosing the appropriate organization type will determine which system defaults are used on setup. For example, in a Professional (Client Billing) organization, where it is useful to charge-back printing to customers, an advanced client popup is provided with additional features useful for dealing with large numbers of client (shared) accounts. These default settings chosen for an organization type can be changed after installation.

2.1.4.3. Default Print Cost

This is the default cost-per-page assigned to the printers. This setting can be changed on a per-printer basis after installation. Choosing a sensible cost now will help minimize future setup. For example in the USA, a value of $0.05 would be appropriate for many standard black & white printers.

2.1.4.4. Initial User Credit for Education or Small/Medium Enterprise Installations

In Education or Small/Medium Enterprise installations, users can be assigned an initial starting credit. This ensures they have funds in their account as soon as the system is enabled. An option also exists to control what happens when users run out of credit/quota. If you are evaluating Print-Limit Pro it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation. These settings may be changed after setup.

2.1.4.5. User/group synchronization

Print-Limit Pro extracts user information out of the System or Domain. The options presented here will vary depending on the Operating System and its environment. During evaluation, most sites will opt to import all users from the system/domain into Print-Limit Pro. An option also exists to import a subset of users from a given group. This option is pertinent when it is known that only a subset of users will only ever use the printers.

User/group synchronization
The system will synchronise user and group information from a network, domain or computer. Please select the user information source.
User source:
Windows Active Directory
Import all users
Import a subset of the users
e.g. a group or org unit. (This will be selected on the next page)
< Previous
Next >

Figure 2.5. User sync configuration wizard page

Options on Microsoft Windows include **Windows Standard**, **Active Directory**, or **LDAP**. In a domain enviroment, **Active Directory** is the default option as this offers access to Organization Units, Nested Groups and other AD features.

Use the **Test Settings** to test and confirm your settings before continuing.

2.1.4.6. Client Settings in Professional (Client Billing) installations

In a Professional (Client Billing) environment, the main focus is on allowing users to allocate print jobs to client (shared) accounts. The process works by:

- Pausing all jobs that enter the print queues.
- Displaying a popup on the user's workstation asking them to allocate the print job to an account. This is done by selecting the account from a list.
- After the user has responded to the popup, the job is released to the printer.

You can read more about the account selection process and shared accounts at Chapter 8, *Shared Accounts*.

The account selection popup option is enabled at the user level. Once the option is enabled, the user *must* run the client software. If the client software is not running, the popup cannot display, and the job will remain paused in the print queue. This option is hence considered high impact. You are presented with two strategies that allow you to choose the implementation approach that best suits your needs:

2.1.4.6.1. Minimal impact (Initial single user testing)

In this strategy the account popup is only initially enabled on a single user for testing. You need to nominate the testing account. You may already have an appropriate test user account on your system/domain or alternatively selecting your own personal account is a good choice. The name should be in the format used to log into the

domain/system (usually the short form).

The minimal impact strategy will give you time to test the popup with the nominated test user Then the **Advanced account selection popup** option can be enabled for other users when appropriate.

2.1.4.6.2. Immediate implementation (Enable for all users)

This strategy enables the account selection popup on all users. This option is good for smaller networks as it minimizes the amount of post-install configuration - just deploy the client and your up! If this option is selected you should be in a position to install the client software on user desktops as soon as possible.

If in doubt, select the minimal impact strategy. This will ensure the impact is isolated to only the nominated test user.

2.1.4.7. Wizard Completion

After completing the configuration wizard you will be presented with a user synchronization status screen and an option to **Login**. Take some time to log in and browse the interface. There are many options and now is a good time to have a look at some of the key areas of the application. Take some time to explore!

2.1.5. Step 5 - Printer Configuration

The printers should be automatically detected, and listed under the **Printers** section. If the printers do not display, try printing a document as the first job will trigger registration.

2.1.6. Step 6 - Sharing Client Software

The Print-Limit Pro client software is located in the directory `[app-path]/client`. This software needs to be shared over the network so workstations can access/install the client application. The directory is automatically shared in read-only form as `PCClient` as part of the install process. Confirm that you can access the client software via the network by browsing to `\\server\PCClient`.

2.1.7. Step 7 - Client Software Deployment (Optional)

The Print-Limit client software may now be deployed if required. The client software is not required for basic print tracking and reporting. Some features the client software provides include:

- Displays notification messages, such as why a print job was denied.
- Displays print policy popups, such as to encourage duplex printing.
- Displays popups for shared account allocation/charging (department accounts, client billing).
- Allow the user to confirm the details and/or cost of their print job before printing.
- Shows the user their current balance (useful in schools where print quotas are used).
- Can be used for authentication when printing from public terminals or other unauthenticated systems.

For a professional (client billing) installation the client software is required so that users can allocate print jobs to client (shared) accounts via a popup. It is recommended to follow the steps in Section 5.2.1, “User Client Deployment” for best practice client deployment methods. After the client software is deployed you may then enable the account selection popup for all users as discussed in Section 8.4.2.1, “Enabling the Advanced Account Selection Popup For All Users”.

For other installation types the client software is optional. If you choose not to deploy the client software you may still choose to deploy it in the future.

For more details about the client software see Section 5.2, “User Client”. For details about deploying the client software see Section 5.2.1, “User Client Deployment”.

2.1.8. Step 8 - Testing

It is now time to test the system, please see Section 2.5, “Testing the Installation”.

2.1.9. What next?

This concludes the Install Guide. You may like to take some time to explore the features of Print-Limit Pro before continuing reading at Chapter 3, *Implementation by Example* or Chapter 4, *Quick Tour*. Business users may be particularly interested in trying the popup client software as covered in Section 4.5, “Client Software”. If desired, the client software should also be deployed to other workstations. This procedure is detailed in Section 5.2, “User Client”.

2.2. Installation on Apple Mac

Important

This guide assumes that you are installing on Mac OS X (either server or workstation) hosting and sharing printers. This guide will refer to this system as the 'server'. This represents the role of the system rather than the 'edition' of the operating system. Print-Limit Pro equally supports both the server and workstation versions of Mac OS. If you're upgrading from a previous Print-Limit Pro version please refer to the directions outlined in Appendix E, *Upgrading From a Previous Version*.

The following section assumes the reader has knowledge of general Mac OS X server management. Although the installation process is graphical, it would be an advantage to have knowledge of the command-line, creating users, editing configuration files and an understanding file permissions.

2.2.1. Step 1 - System Requirements

Before proceeding with the installation the system administrator should take a few moments to verify system requirements. Is the operating system version supported and are patches up-to-date? Take a few minutes to verify the system is current and supported (see Section 1.1.3, “System Requirements”). A system prerequisite is Java version 5.0 or higher. If you are running a fully patched Tiger, Leopard, or Snow Leopard machine this requirement will be satisfied. If you are running Lion you will need to download and install Java from the Apple web site (download from: http://support.apple.com/kb/DL1421).

2.2.2. Step 2 - Print Queue Setup

Most small to medium Mac networks will have their workstations configured to print directly to the physical printers. This method of printing is *not* supported by Print-Limit Pro and instead administrators will need to set up global server hosted print queues. Some administrators will be familiar with server queues, while others will need to invest some time into understanding Mac printing in more detail. The topic of Mac printing is complex and is hence deserves its own chapter! Please read the first section of Chapter 23, *Mac Printing in Detail* and ensure your organization's printers are set up as required.

Administrators should ensure that the server based print queues are set up and working as expected *before* attempting to install Print-Limit Pro.

2.2.3. Step 3 - Download and install

Print-Limit Pro is supplied as a standard disk image containing the installer. Log on as an `admin` level account. Download and double-click Mac installer. Double-click on the installer package named `Print-Limit Pro Standard Installation.pkg`. Follow the directions on the screen. The installation process will take between two and five minutes depending on the speed of the system. A system restart is not required but administrators are advised to perform installation on live production systems during periods of low activity - for example, not during backup operations or other administration activities.

The default install location is `/Applications/Print-Limit Pro`

Important

Make sure you're installing the correct package. The similarly named `Print-Limit Pro Secondary Server Installation.pkg` only installs part of the application and is designed for

more advanced networks.

2.2.4. Step 4 - Configuration Wizard

After installation, the install will open a web browser window. The configuration stages are explained below:

2.2.4.1. Administrator Password

This is the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. Keep knowledge of this password secure! This screen also sets the system's physical location. Ensure the location and language setting is correct.

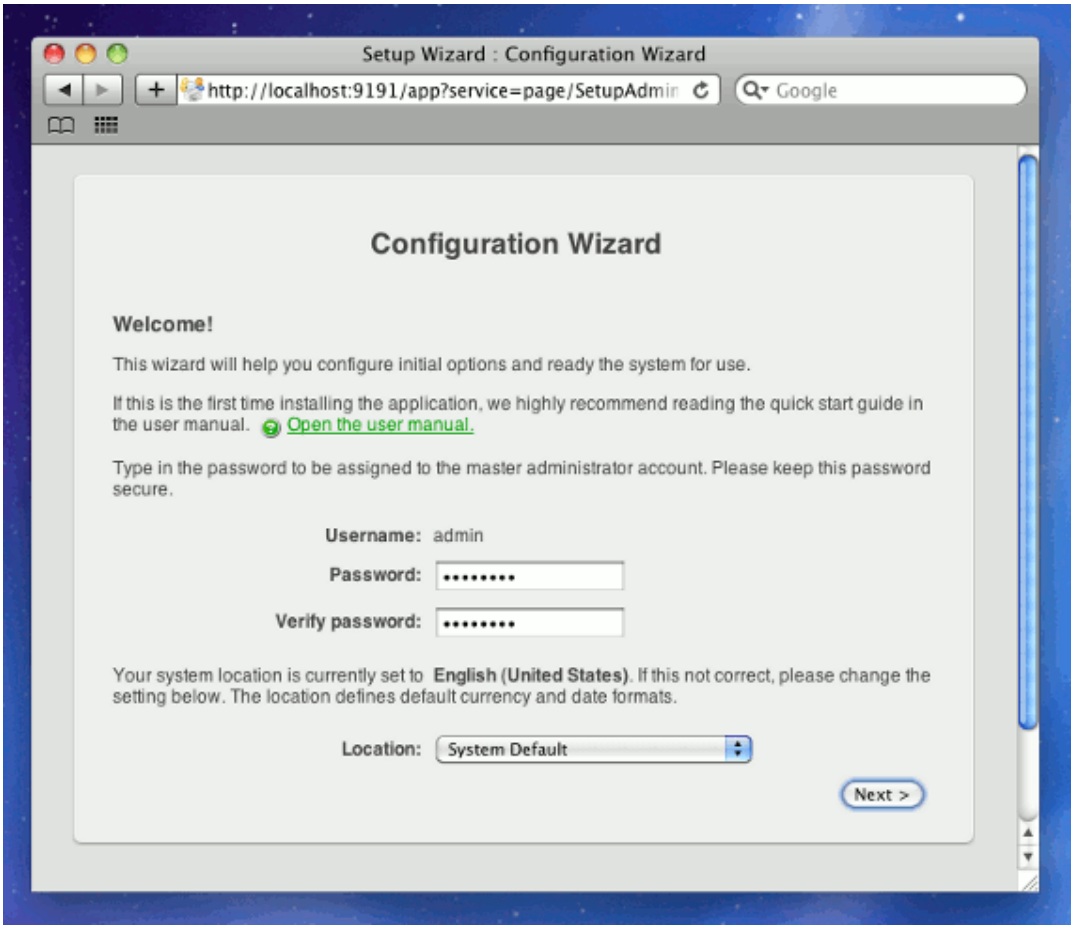

Setup Wizard : Configuration Wizard
http://localhost:9191/app?service=page/SetupAdmin
Google
Configuration Wizard
Welcome!
This wizard will help you configure initial options and ready the system for use.
If this is the first time installing the application, we highly recommend reading the quick start guide in the user manual.
Open the user manual.
Type in the password to be assigned to the master administrator account. Please keep this password secure.
Username: admin
Password:
Verify password:
Your system location is currently set to English (United States). If this not correct, please change the setting below. The location defines default currency and date formats.
Location: System Default
Next >

Figure 2.6. Print-Limit Pro Configuration wizard

Tip

Treat this password like your router/modem management passwords. It is independent of your domain accounts and needs to be kept secure.

2.2.4.2. Organization Type

This is the organization type which matches the organizational environment where Print-Limit Pro will be used.

Choosing the appropriate organization type will determine which system defaults are used on setup. For example, in a Professional (Client Billing) organization, where it is useful to charge-back printing to customers, an advanced client popup is provided with additional features useful for dealing with large numbers of client (shared) accounts. These default settings chosen for an organization type can be changed after installation.

2.2.4.3. Default Print Cost

This is the default cost-per-page assigned to the printers. This setting can be changed on a per printer basis after installation. Choosing a sensible cost now will help minimize future setup. For example in the USA, a value of $0.05 would be appropriate for many standard black & white printers.

2.2.4.4. Initial User Credit for Education or Small/Medium Enterprise Installations

In Education or Small/Medium Enterprise installations, users can be assigned an initial starting credit. This ensures they have funds in their account as soon as the system is enabled. An option also exists to control what happens when users run out of credit/quota. If you are evaluating Print-Limit Pro it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation. These settings may be changed after setup.

2.2.4.5. User/group synchronization

Print-Limit Pro extracts user information out of the System or Domain. The options presented here will vary depending on the Operating System and its environment. During evaluation, most sites will opt to import all users from the system/domain into Print-Limit Pro. An option also exists to import a subset of users from a given group. This option is pertinent when it is known that only a subset of users will only ever use the printers.

User/group synchronization
The system will synchronise user and group information from a network, domain or computer. Please select the user information source.
User source:
Windows Active Directory
Import all users
Import a subset of the users
e.g. a group or org unit. (This will be selected on the next page)
< Previous
Next >

Figure 2.7. User sync configuration wizard page

Options include **Mac Standard** (PAM, Local NetInfo, etc.), **LDAP** (Open Directory), or **Samba**. Select **Mac Standard** if the user accounts are setup and defined on the local system. This option will work with most Mac networks.

The LDAP option is appropriate for large networks with existing Open Directory domains. This includes networks running Mac OS X Server with Open Directory, and Windows domains running Active Directory. Print-Limit Pro will do it's best to auto discover LDAP settings, but some knowledge of LDAP and/or Open Directory will be required. More information on LDAP is available in Section 12.3.9, “Using LDAP for user synchronization”.

Use the **Test Settings** to test and confirm your settings before continuing.

2.2.4.6. Client Settings in Professional (Client Billing) installations

In a Professional (Client Billing) environment, the main focus is on allowing users to allocate print jobs to client (shared) accounts. The process works by:

- Pausing all jobs that enter the print queues.
- Displaying a popup on the user's workstation asking them to allocate the print job to an account. This is done by

selecting the account from a list.

- After the user has responded to the popup, the job is released to the printer.

You can read more about the account selection process and shared accounts at Chapter 8, *Shared Accounts*.

The account selection popup option is enabled at the user level. Once the option is enabled, the user *must* run the client software. If the client software is not running, the popup cannot display, and the job will remain paused in the print queue. This option is hence considered high impact. You are presented with two strategies that allow you to choose the implementation approach that best suits your needs:

2.2.4.6.1. Minimal impact (Initial single user testing)

In this strategy the account popup is only initially enabled on a single user for testing. You need to nominate the testing account. You may already have an appropriate test user account on your system/domain or alternatively selecting your own personal account is a good choice. The name should be in the format used to log into the domain/system (usually the short form).

The minimal impact strategy will give you time to test the popup with the nominated test user Then the **Advanced account selection popup** option can be enabled for other users when appropriate.

2.2.4.6.2. Immediate implementation (Enable for all users)

This strategy enables the account selection popup on all users. This option is good for smaller networks as it minimizes the amount of post-install configuration - just deploy the client and your up! If this option is selected you should be in a position to install the client software on user desktops as soon as possible.

If in doubt, select the minimal impact strategy. This will ensure the impact is isolated to only the nominated test user.

2.2.4.7. Wizard Completion

After completing the configuration wizard you will be presented with a user synchronization status screen and an option to **Login**. Take some time to log in and browse the interface. There are many options and now is a good time to have a look at some of the key areas of the application. Take some time to explore!

2.2.5. Step 5 - Printer Configuration

The printers should be automatically detected, and listed under the **Printers** section. If the printers do not display, try printing a document as the first job will trigger registration.

2.2.6. Step 6 - Sharing Client Software

The Print-Limit Pro client software is located in the directory `/Applications/Print-Limit Pro/client`. It may be useful to share this directory over the network so workstations can access/install the client application. If you're running Mac OS X Server, use **Server Admin** to add a read-only file share called `PCClient`. Sharing with Protocols AFP for Mac clients, and SMB for Windows clients is recommended.

2.2.7. Step 7 - Testing

It is now time to test the system, please see Section 2.5, “Testing the Installation”.

2.2.8. Step 8 - Deployment for a Professional (Client Billing) Installation

NOTE: This step is a requirement for a Professional (Client Billing) installation.

Now that the system is tested and working, it is time to deploy the client software and enable the account popup for their use. It is important to deploy the client software before enabling the popup, otherwise users' printing will be stopped/paused.

2.2.8.1. Deploy the client software

As discussed earlier in the chapter the client can be run directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however this is

not usually recommended because it makes the process of updating the client software more complicated.

Client deployment options and instruction are discussed in detail in Section 5.2.1, “User Client Deployment”. Follow those instructions to deploy the client software, and then enable the popup as described below.

2.2.8.2. Enable the advanced client popup

Once the client software is deployed on user workstations, the **Account Selection** can be set. In a Professional (Client Billing) configuration, all users that print jobs for clients are often given the Advanced account selection popup, however, other **Account Selection** options may be better suited for some users based on their job function. The popup can be enabled on one user at a time or can be updated for all users in bulk. The user details page can be used to enable the popup for a single user. To enable the popup for all users in bulk:

1. Log into the admin interface.
2. Under the **Users** section, select the **Bulk user actions...** action from the menu at the top left of the **Users** tab.
3. Select the target group. To enable for all users select the `[All Users]` group.
4. In the **Change account selection setting** section, enable the **Change account selection** option.
5. Select the **Show the advanced account selection popup** option from the list.
6. If you do not want to allow users to charge printing to their personal account, then disable the **Allow user to charge to their personal account** option.
7. Press the **OK** button, and confirm the operation. Once completed, the selected users will have the account popup enabled.

Once the popup has been enabled on all users some testing should be performed from users' desktops. To test, login to the user workstation, perform a print, and check that the account popup appears and the job is logged as expected.

2.2.9. What next?

This concludes the Install Guide. You may like to take some time to explore the features of Print-Limit Pro before continuing reading at Chapter 3, *Implementation by Example* or Chapter 4, *Quick Tour*. Business users may be particularly interested in trying the popup client software as covered in Section 4.5, “Client Software”. If desired, the client software should also be deployed to other workstations. This procedure is detailed in Section 5.2, “User Client”.

2.3. Installation on Novell OES Linux (iPrint)

Important

The following section assumes the reader has knowledge of general Novell OES Linux system management including using the command-line, creating users, editing configuration files and understanding file permissions.

2.3.1. Step 1 - System Requirements & Printer Setup

Before proceeding with the installation the system administrator should take a few moments to verify system requirements. Is the operating system version supported and are patches up-to-date? Take a few minutes to verify the system is current and supported (see Section 1.1.3, “System Requirements”). Print-Limit Pro is designed to integrate with iPrint on Novell OES Linux. If your printers are currently hosted on iPrint on a Netware server or even under legacy NDPS, you will first need to migrate your queues over to a OES Linux based server. Ensure your printing is correctly working under iPrint on OES Linux before continuing to the next step.

Important: iPrint and the print queues must be configured and confirmed to work *before* progressing to step 2.

2.3.2. Step 2 - Create the host user account and firewall settings

Print-Limit Pro runs and installs under a non-privileged user account called "printlimit". The `printlimit` user's home directory location denotes the application install location. `/home/printlimit` is recommended, however Administrators may consider alternate install locations depending on personal preference. Alternatives may include:

- `/usr/local/printlimit`
- `/opt/printlimit`

The host user account is *not* an eDirectory account but a local system account. One way to create the "printlimit" account on OES Linux is:

1. Open **YaST Control Panel** and select **User Management** under **Security and Users**.
2. Click **Add** to create a new user.
3. On the **User Data** tab, enter a username of `printlimit` and assign a secret password.
4. On the **Details** tab, select `Empty Home` with permissions `755` and change the `Home Directory` path to define an alternate install location.
5. Create the account by clicking the **Accept** button.

Important

This quick start guide assumes the install location is `/home/printlimit`. If an alternate home location is defined, some of the paths listed in subsequent sections will require modification.

A default OES Linux installation imposes strict resource usage limits on user accounts (`ulimit`). The `printlimit` account is a special account used for hosting an application and hence should be granted satisfactory resource limits such as the ability to open many files. Larger sites should consider adding the following line to `/etc/security/limits.conf`:

```
printlimit    -    nofile    65535
```

Novell OES Linux has a strict default firewall policy. Print-Limit Pro uses ports 9191 (for HTTP) and ports 9192 (for HTTPS/SSL) and these ports must be open. To open these ports:

1. Open **YaST Control Panel** and select **Firewall** under **Security and Users**.
2. Select **Allowed Services**, then click the **Advanced...** button.
3. Add ports `9191` and `9192` to the **TCP Ports** list (separated by spaces).
4. Click **OK**, **Next**, then **Accept** to apply the changes.

2.3.3. Step 3 - Download and installing

Important: Please make sure you download the correct architecture for your distribution. `i686` is for 32-bit operating systems. `x64` is for 64-bit systems (also known as `x86_64` or `amd64`).

Print-Limit Pro is supplied as a self-extracting and self-installing archive. The installation is performed under the rights of the newly created `printlimit` account and temporary `root` access will be required. Please have the root password handy. (Administrators who are after a detailed explanation of the install process should also consult the background information in Chapter 21, *Print-Limit Pro on Linux*).

Log on as the newly created `printlimit` user and download and execute the installer from the command prompt. Here is an example using `wget` to fetch the installer:

```
shell> su - printlimit
```

```
shell> wget [download url from Netop website]
shell> sh ./plp-setup-novell-oes-linux.sh
```

Follow the installation instructions and enter the root password when requested.

Important

Ensure you `login` as the user `printlimit` so that the user's environment is sourced and the home directory (install location) is correctly defined.

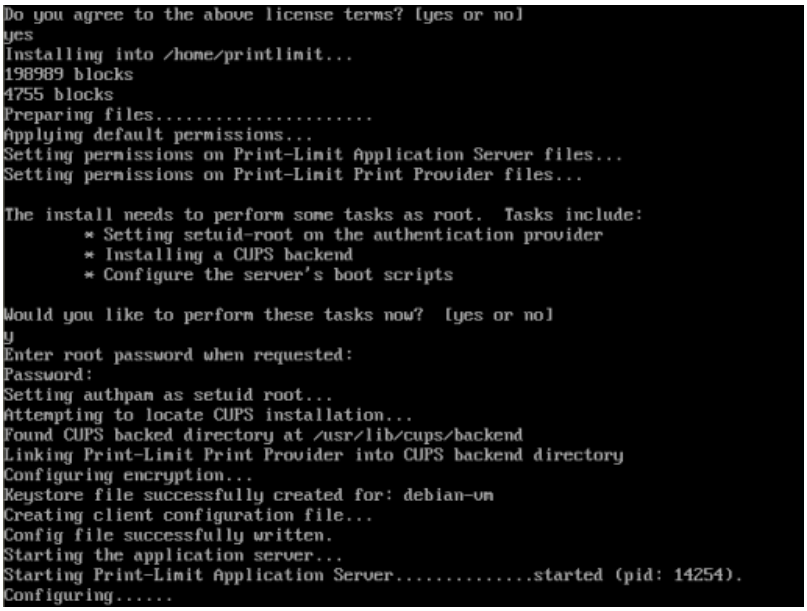

Do you agree to the above license terms? [yes or no]
yes
Installing into /home/printlimit...
198989 blocks
4755 blocks
Preparing files.....................
Applying default permissions...
Setting permissions on Print-Limit Application Server files...
Setting permissions on Print-Limit Print Provider files...
The install needs to perform some tasks as root. Tasks include:
* Setting setuid-root on the authentication provider
* Installing a CUPS backend
* Configure the server's boot scripts
Would you like to perform these tasks now? [yes or no]
y
Enter root password when requested:
Password:
Setting authpam as setuid root...
Attempting to locate CUPS installation...
Found CUPS backed directory at /usr/lib/cups/backend
Linking Print-Limit Print Provider into CUPS backend directory
Configuring encryption...
Keystore file successfully created for: debian-vm
Creating client configuration file...
Config file successfully written.
Starting the application server...
Starting Print-Limit Application Server.....started (pid: 14254).
Configuring.....

Figure 2.8. The Novell OES Linux install process

The installation process will take between two and five minutes depending on the speed of the system. A system restart is not required but administrators are advised to perform installation on live production systems during periods of low activity - for example, not during backup operations or other administration activities.

2.3.4. Step 4 - Configuration Wizard

After installation, you will be prompted to open a web browser at `http://[server-name]:9191/admin` to complete configuration. The configuration stages are explained below:

2.3.4.1. Administrator Password

This is the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. Keep knowledge of this password secure! This screen also sets the system's physical location. Ensure the location and language setting is correct.

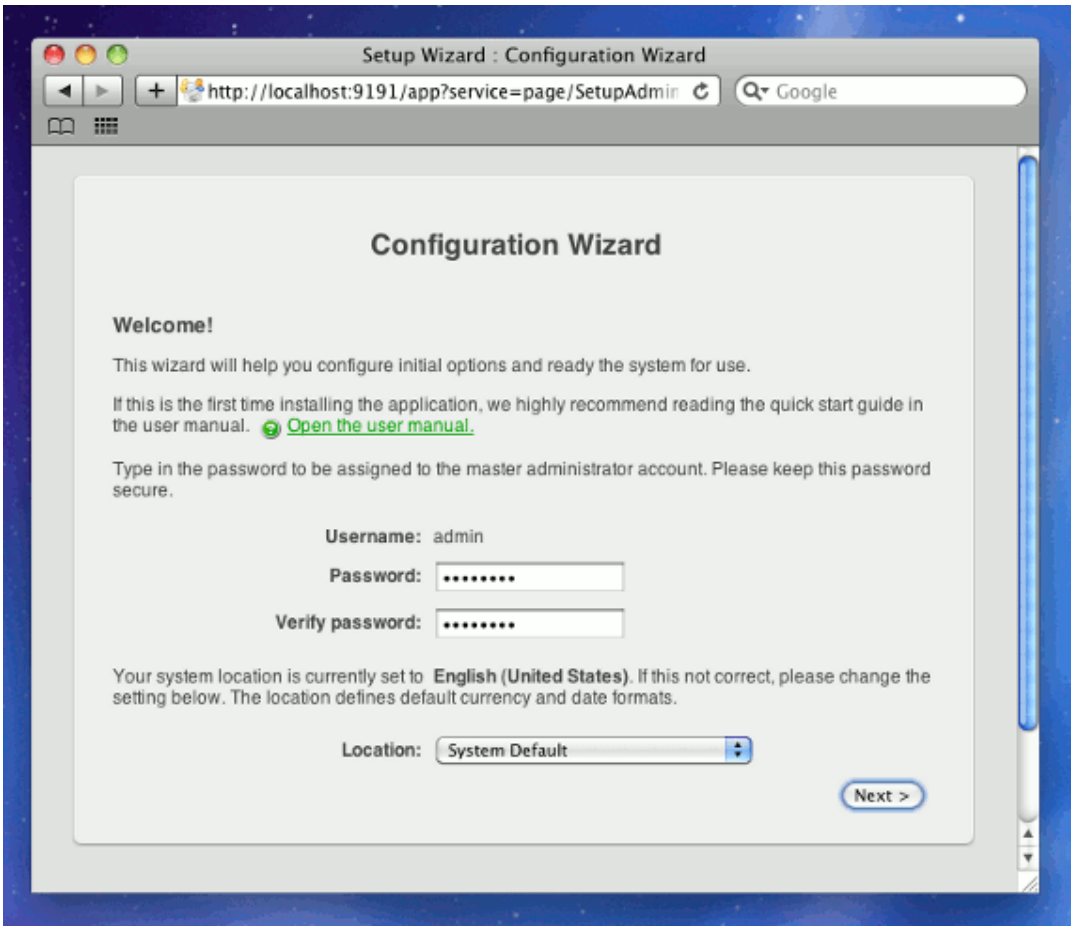

Setup Wizard : Configuration Wizard
http://localhost:9191/app?service=page/SetupAdmin
Google
Configuration Wizard
Welcome!
This wizard will help you configure initial options and ready the system for use.
If this is the first time installing the application, we highly recommend reading the quick start guide in the user manual.
Open the user manual.
Type in the password to be assigned to the master administrator account. Please keep this password secure.
Username: admin
Password:
Verify password:
Your system location is currently set to English (United States). If this not correct, please change the setting below. The location defines default currency and date formats.
Location: System Default
Next >

Figure 2.9. Print-Limit Pro Configuration wizard

Tip

Treat this password like your router/modem management passwords. It is independent of your domain accounts and needs to be kept secure.

2.3.4.2. Organization Type

This is the organization type which matches the organizational environment where Print-Limit Pro will be used. Choosing the appropriate organization type will determine which system defaults are used on setup. For example, in a Professional (Client Billing) organization, where it is useful to charge-back printing to customers, an advanced client popup is provided with additional features useful for dealing with large numbers of client (shared) accounts. These default settings chosen for an organization type can be changed after installation.

2.3.4.3. Default Print Cost

This is the default cost-per-page assigned to the printers. This setting can be changed on a per printer basis after installation. Choosing a sensible cost now will help minimize future setup. For example in the USA, a value of $0.05 would be appropriate for many standard black & white printers.

2.3.4.4. Initial User Credit for Education or Small/Medium Enterprise Installations

In Education or Small/Medium Enterprise installations, users can be assigned an initial starting credit. This ensures they have funds in their account as soon as the system is enabled. An option also exists to control what happens when users run out of credit/quota. If you are evaluating Print-Limit Pro it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation. These settings may be changed after setup.

2.3.4.5. User/group synchronization

Print-Limit Pro extracts user information out of the System or Domain. The options presented here will vary depending on the Operating System and its environment. During evaluation, most sites will opt to import all users from the system/domain into Print-Limit Pro. An option also exists to import a subset of users from a given group. This option is pertinent when it is known that only a subset of users will only ever use the printers.

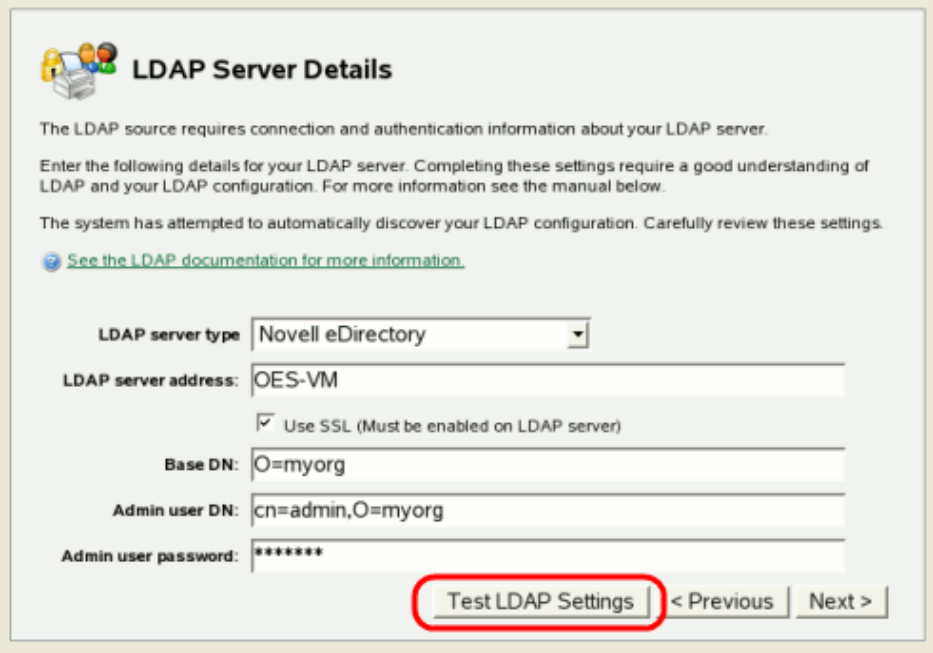

LDAP Server Details
The LDAP source requires connection and authentication information about your LDAP server.
Enter the following details for your LDAP server. Completing these settings require a good understanding of LDAP and your LDAP configuration. For more information see the manual below.
The system has attempted to automatically discover your LDAP configuration. Carefully review these settings.
See the LDAP documentation for more information.
LDAP server type
Novell eDirectory
LDAP server address:
OES-VM
Use SSL (Must be enabled on LDAP server)
Base DN:
O=myorg
Admin user DN:
cn=admin,O=myorg
Admin user password:
****
Test LDAP Settings
< Previous
Next >

Figure 2.10. eDirectory/LDAP configuration wizard page

Print-Limit Pro has native support for eDirectory LDAP schemas. This will be the default user import option for most sites. Print-Limit Pro will do it's best to auto-discover LDAP settings, but some knowledge of eDirectory and/or LDAP will be required. More information on LDAP is available in Section 12.3.9, “Using LDAP for user synchronization”.

2.3.4.6. Client Settings in Professional (Client Billing) installations

In a Professional (Client Billing) environment, the main focus is on allowing users to allocate print jobs to client (shared) ccounts. The process works by:

- Pausing all jobs that enter the print queues.
- Displaying a popup on the user's workstation asking them to allocate the print job to an account. This is done by selecting the account from a list.
- After the user has responded to the popup, the job is released to the printer.

You can read more about the account selection process and shared accounts at Chapter 8, *Shared Accounts*.

The account selection popup option is enabled at the user level. Once the option is enabled, the user *must* run the client software. If the client software is not running, the popup cannot display, and the job will remain paused in the print queue. This option is hence considered high impact. You are presented with two strategies that allow you to choose the implementation approach that best suits your needs:

2.3.4.6.1. Minimal impact (Initial single user testing)

In this strategy the account popup is only initially enabled on a single user for testing. You need to nominate the testing account. You may already have an appropriate test user account on your system/domain or alternatively selecting your own personal account is a good choice. The name should be in the format used to log into the domain/system (usually the short form).

The minimal impact strategy will give you time to test the popup with the nominated test user Then the **Advanced account selection popup** option can be enabled for other users when appropriate.

2.3.4.6.2. Immediate implementation (Enable for all users)

This strategy enables the account selection popup on all users. This option is good for smaller networks as it minimizes the amount of post-install configuration - just deploy the client and your up! If this option is selected you should be in a position to install the client software on user desktops as soon as possible.

If in doubt, select the minimal impact strategy. This will ensure the impact is isolated to only the nominated test user.

2.3.4.7. Wizard Completion

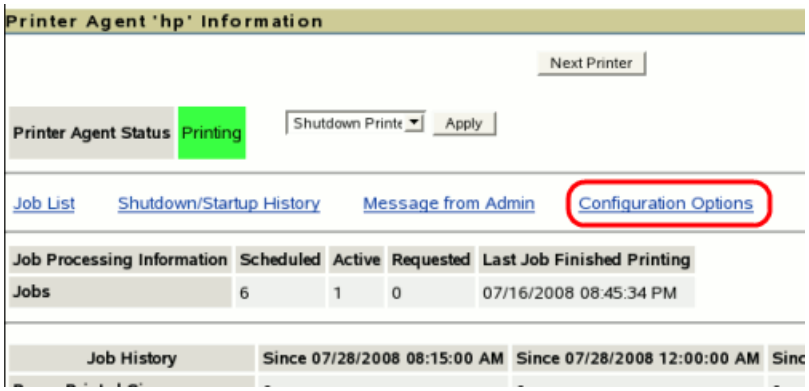
After completing the configuration wizard you will be presented with a user synchronization status screen and an option to **Login**. Take some time to log in and browse the interface. There are many options and now is a good time to have a look at some of the key areas of the application. Take some time to explore!

2.3.5. Step 5 - Printer/iPrint Configuration

Print-Limit Pro works by directly integrating with the Novell iPrint Print Manager. iPrint must however be configured to use Print-Limit Pro as an accounting control source. In the current release, this configuration is done manually at the individual print queue level:

1. Log into iManager, expand **iPrint**, and select **Manage Printer Manager**
2. Select the Printer Manager associated with one of your print queues.
3. Click the **Manage health monitor** link. A list of all your printers should appear.

4. Select a *Printer Agent* from the list.
5. Click **Configuration Options**.



6. Enter `printlimit` under the **Accounting Autoload Command**. Take care to write this all in lower case with no spaces.
7. Click **Apply**.
8. Click **Back**, then **Back** and repeat steps 4 through 7 for all printers that should be monitored/controlled by Print-Limit Pro
9. In line with best practice, backup the new printer configuration (`padbtxt.xml`) as follows:
   a. In iManager open up the active *Print Manager*.
   b. Select **Manager health monitor** → **Advanced iPrint Manager Information** → **iPrint Manager Internal**
   c. Click the button **Backup Database**.
10. Finally restart the *Printer Manager* in iManager by pressing **Shutdown** then **Startup**. After this, all jobs on the queues should be tracked.

2.3.6. Step 6 - Sharing Client Software

The Print-Limit Pro client software is located in the local directory:

```
/home/printlimit/client
```

This software needs to be shared over the network so workstations can access/install the client application. Novell iManager provides a number of file sharing options. One simple solution is to add a read-only NCP or Samba share called `PCClient` pointing to `/home/printlimit/client`. Established networks will benefit from ensuring the client files are available in their Distributed Files Services. The deployment of the client software (e.g. zero-install deployment) is covered in Section 5.2, “User Client”.

2.3.7. Step 7 - Testing

It is now time to test the system, please see Section 2.5, “Testing the Installation”.

2.3.8. Step 8 - Deployment for a Professional (Client Billing) Installation

NOTE: This step is a requirement for a Professional (Client Billing) installation.

Now that the system is tested and working, it is time to deploy the client software and enable the account popup for their use. It is important to deploy the client software before enabling the popup, otherwise users' printing will be stopped/paused.

2.3.8.1. Deploy the client software

As discussed earlier in the chapter the client can be run directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however this is not usually recommended because it makes the process of updating the client software more complicated.

Client deployment options and instruction are discussed in detail in Section 5.2.1, “User Client Deployment”. Follow

those instructions to deploy the client software, and then enable the popup as described below.

2.3.8.2. Enable the advanced client popup

Once the client software is deployed on user workstations, the **Account Selection** can be set. In a Professional (Client Billing) configuration, all users that print jobs for clients are often given the Advanced account selection popup, however, other **Account Selection** options may be better suited for some users based on their job function. The popup can be enabled on one user at a time or can be updated for all users in bulk. The user details page can be used to enable the popup for a single user. To enable the popup for all users in bulk:

1. Log into the admin interface.
2. Under the **Users** section, select the **Bulk user actions...** action from the menu at the top left of the **Users** tab.
3. Select the target group. To enable for all users select the `[All Users]` group.
4. In the **Change account selection setting** section, enable the **Change account selection** option.
5. Select the **Show the advanced account selection popup** option from the list.
6. If you do not want to allow users to charge printing to their personal account, then disable the **Allow user to charge to their personal account** option.
7. Press the **OK** button, and confirm the operation. Once completed, the selected users will have the account popup enabled.

Once the popup has been enabled on all users some testing should be performed from users' desktops. To test, login to the user workstation, perform a print, and check that the account popup appears and the job is logged as expected.

2.3.9. What next?

This concludes the Install Guide. You may like to take some time to explore the features of Print-Limit Pro before continuing reading at Chapter 3, *Implementation by Example* or Chapter 4, *Quick Tour*. Business users may be particularly interested in trying the popup client software as covered in Section 4.5, “Client Software”. If desired, the client software should also be deployed to other workstations. This procedure is detailed in Section 5.2, “User Client”.

2.4. Installation on Linux (CUPS and/or Samba)

Important

The following section assumes the reader has knowledge of general Unix/Linux system management including using the command-line, creating users, editing configuration files and understanding file permissions.

2.4.1. Step 1 - System Requirements

Before proceeding with the installation the system administrator should take a few moments to verify system requirements. Is the operating system version supported and are patches up-to-date? Take a few minutes to verify the system is current and supported (see Section 1.1.3, “System Requirements”).

Are printer(s) installed and hosted on this system and are they exposed to the network either via CUPS or Samba? Administrators should ensure that the print queues are set up and working as expected before attempting to install Print-Limit Pro.

In a multi-user environment, printers are often shared with other network users. Other workstations should connect to these printers as "Network Printers". Ensure workstations are configured to print to the shared print queues. For example a Windows workstation may connect to a samba exposed printer via `\\[samba_server]\[printer]`. Other Linux or Mac workstations will use IPP via CUPS.

If the printers are currently not installed and configured, this task should be performed and verified before proceeding further.

2.4.2. Step 2 - Create the host user account and firewall settings

Print-Limit Pro runs and installs under a non-privileged user account called "printlimit". The installation location for the application is the `printlimit` user's home directory. Create a user account on this system called `printlimit`. This is usually done by logging in as `root` and using a user management GUI tool or at the command prompt entering:

```
shell> useradd -m -d /home/printlimit printlimit
```

The syntax for `useradd` and `groupadd` may differ slightly on different versions of Linux. They may also be called `adduser` and `addgroup`.

The user's home directory (the `-d` option) denotes the install location. `/home/printlimit` is the recommended location. Administrators may however also consider alternate install locations depending on personal preference. Alternatives may include:

- `/usr/local/printlimit`
- `/opt/printlimit`

Important

This quick start guide assumes the install location is `/home/printlimit`. If an alternate home location is defined, some of the paths listed in subsequent sections will require modification.

Some Linux distributions impose strict resource usage limits on user accounts (`ulimit`). The `printlimit` account is a special account used for hosting an application and hence should be granted satisfactory resource limits such as the ability to open many files. The methods of setting user-level `ulimit` levels vary from distribution to distribution, however the common solution is to add the following line to `/etc/security/limits.conf`:

```
printlimit    -    nofile    65535
```

Many Linux distributions have strict default firewall policies. Print-Limit Pro uses TCP ports 9191 (for HTTP) and ports 9192 (for HTTPS/SSL) and these ports must be open. Take some time now to ensure these ports are open. Consult your distribution documentation for details on how to open firewall TCP ports.

2.4.3. Step 3 - Download and installing

Important: Please make sure you download the correct architecture for your distribution. `i686` is for 32-bit operating systems. `x64` is for 64-bit systems (also known as `x86_64` or `amd64`).

Print-Limit Pro is supplied as a self-extracting and self-installing archive. The installation is done under the rights of the newly created `printlimit` and temporary `root` access will be required for part of the install. Please have the root password or `sudo` password handy. (Administrators who are after a detailed explanation of the install process should also consult the background information in Chapter 21, *Print-Limit Pro on Linux*).

Log on as the newly created `printlimit` user and download and execute the installer:

```
shell> su - printlimit
shell> wget [download url from Netop website]
shell> sh ./plp-setup-*-linux-*.sh
```

Follow the installation instructions and enter the root password when requested.

Important

Ensure you `login` as the user `printlimit` so that the user's environment is sourced so the home directory (install location) is correctly defined.

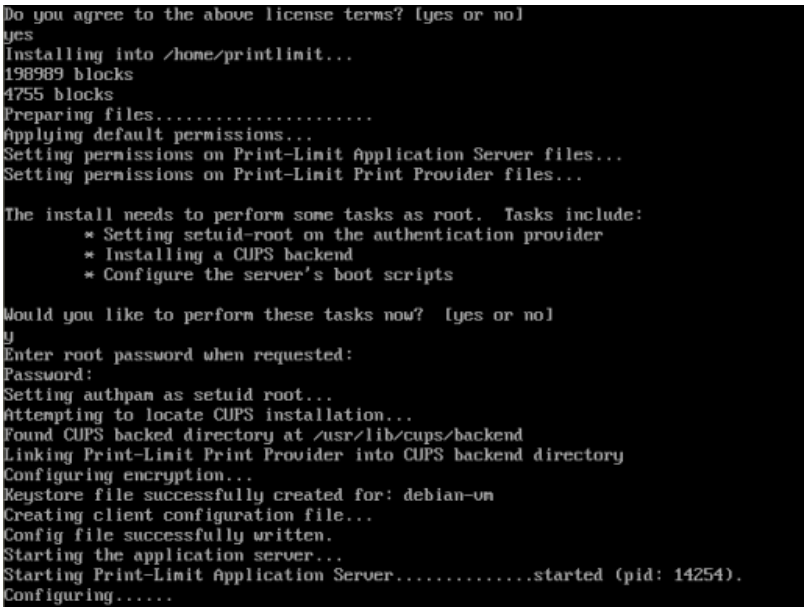

Do you agree to the above license terms? [yes or no]
yes
Installing into /home/printlimit...
198989 blocks
4755 blocks
Preparing files.....
Applying default permissions...
Setting permissions on Print-Limit Application Server files...
Setting permissions on Print-Limit Print Provider files...
The install needs to perform some tasks as root. Tasks include:
* Setting setuid-root on the authentication provider
* Installing a CUPS backend
* Configure the server's boot scripts
Would you like to perform these tasks now? [yes or no]
y
Enter root password when requested:
Password:
Setting authpam as setuid root...
Attempting to locate CUPS installation...
Found CUPS backed directory at /usr/lib/cups/backend
Linking Print-Limit Print Provider into CUPS backend directory
Configuring encryption...
Keystore file successfully created for: debian-vm
Creating client configuration file...
Config file successfully written.
Starting the application server...
Starting Print-Limit Application Server.....started (pid: 14254).
Configuring.....

Figure 2.11. The Linux install process

The installation process will take between two and five minutes depending on the speed of the system. A system restart is not required but administrators are advised to perform installation on live production systems during periods of low activity - for example, not during backup operations or other administration activities.

2.4.4. Step 4 - Configuration Wizard

After installation, you will be prompted to open a web browser at `http://[server-name]:9191/admin` to complete configuration. The configuration stages are explained below:

2.4.4.1. Administrator Password

This is the master password for the main in-built admin account. This password is independent of the operating system or domain passwords. Keep knowledge of this password secure! This screen also sets the system's physical location. Ensure the location and language setting is correct.

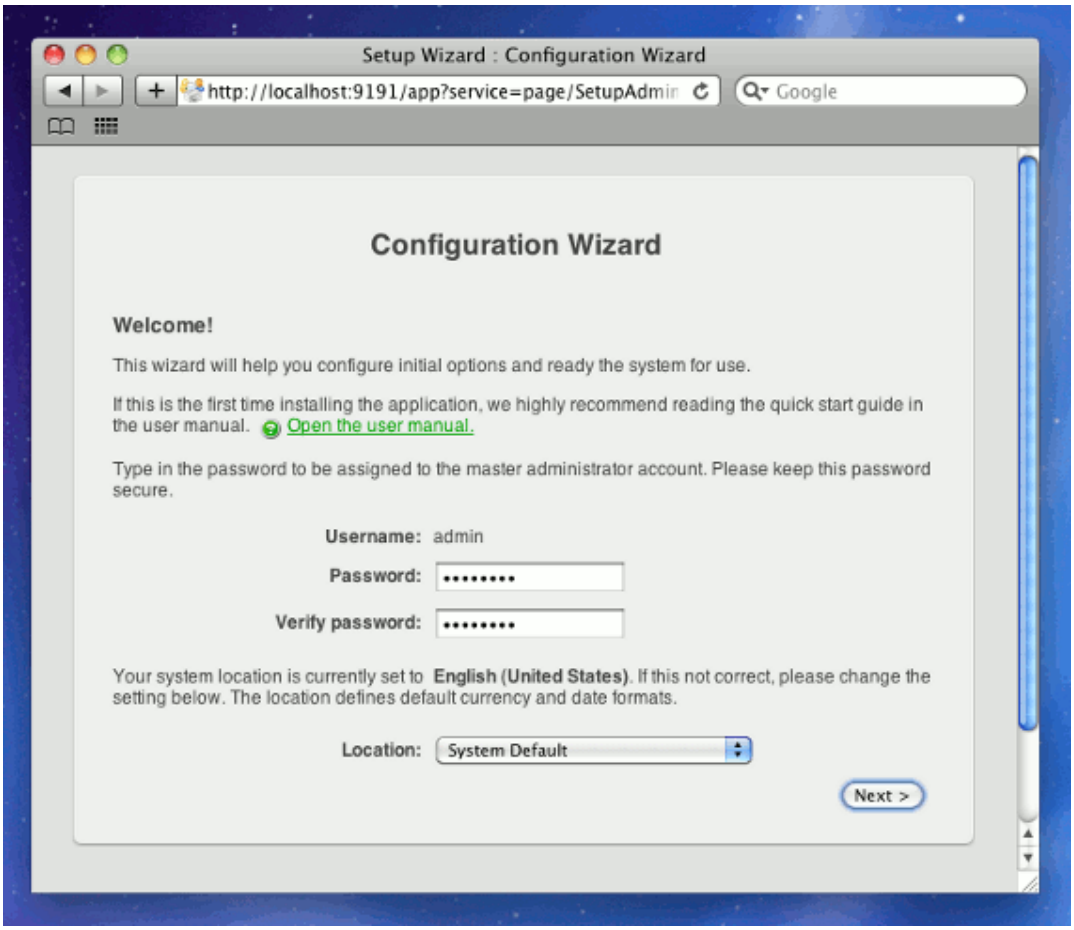

Setup Wizard : Configuration Wizard
http://localhost:9191/app?service=page/SetupAdmin
Google
Configuration Wizard
Welcome!
This wizard will help you configure initial options and ready the system for use.
If this is the first time installing the application, we highly recommend reading the quick start guide in the user manual.
Open the user manual.
Type in the password to be assigned to the master administrator account. Please keep this password secure.
Username: admin
Password:
Verify password:
Your system location is currently set to English (United States). If this not correct, please change the setting below. The location defines default currency and date formats.
Location: System Default
Next >

Figure 2.12. Print-Limit Pro Configuration wizard

Tip

Treat this password like your router/modem management passwords. It is independent of your domain accounts and needs to be kept secure.

2.4.4.2. Organization Type

This is the organization type which matches the organizational environment where Print-Limit Pro will be used. Choosing the appropriate organization type will determine which system defaults are used on setup. For example, in a Professional (Client Billing) organization, where it is useful to charge-back printing to customers, an advanced client popup is provided with additional features useful for dealing with large numbers of client (shared) accounts. These default settings chosen for an organization type can be changed after installation.

2.4.4.3. Default Print Cost

This is the default cost-per-page assigned to the printers. This setting can be changed on a per printer basis after installation. Choosing a sensible cost now will help minimize future setup. For example in the USA, a value of $0.05 would be appropriate for many standard black & white printers.

2.4.4.4. Initial User Credit for Education or Small/Medium Enterprise Installations

In Education or Small/Medium Enterprise installations, users can be assigned an initial starting credit. This ensures they have funds in their account as soon as the system is enabled. An option also exists to control what happens when users run out of credit/quota. If you are evaluating Print-Limit Pro it might be appropriate not to disable printing when a users funds run out. This way you can be assured that user printing is not disrupted during the evaluation. These settings may be changed after setup.

2.4.4.5. User/group synchronization

Print-Limit Pro extracts user information out of the System or Domain. The options presented here will vary depending on the Operating System and its environment. During evaluation, most sites will opt to import all users from the system/domain into Print-Limit Pro. An option also exists to import a subset of users from a given group. This option is pertinent when it is known that only a subset of users will only ever use the printers.

User/group synchronization
The system will synchronise user and group information from a network, domain or computer. Please select the user information source.
User source:
Windows Active Directory
Import all users
Import a subset of the users
e.g. a group or org unit. (This will be selected on the next page)
< Previous
Next >

Figure 2.13. User sync configuration wizard page

Options on Linux include **Unix Standard** (PAM, NIS, etc.), **LDAP**, or **Samba**.

Select **Unix Standard** if the user accounts are setup and defined on the local system as standard Unix accounts or mapped into the system from a central directory service such as LDAP via nsswitch.conf and PAM. Most large established networks will use this option.

The LDAP option is appropriate for large networks with existing Open Directory domains. This includes networks running Open LDAP and Windows domains running Active Directory. Print-Limit Pro will do it's best to auto-discover LDAP settings, but some knowledge of LDAP and/or Open Directory will be required. More information on LDAP is available in Section 12.3.9, “Using LDAP for user synchronization”.

Select **Samba** if the central user directory is a Windows Domain. The Samba option is only available if Samba is installed on the system. The Samba option is appropriate on medium to small networks currently operating in a Windows Domain environment.

The Samba option requires additional information such as the name of a domain server, and login credentials for an Administrator level account. This information is requested on the subsequent wizard screen. Take care to ensure this information is complete and correct.

More information on user/group synchronization on Linux is available in Chapter 21, *Print-Limit Pro on Linux*.

2.4.4.6. Client Settings in Professional (Client Billing) installations

In a Professional (Client Billing) environment, the main focus is on allowing users to allocate print jobs to client (shared) accounts. The process works by:

- Pausing all jobs that enter the print queues.
- Displaying a popup on the user's workstation asking them to allocate the print job to an account. This is done by selecting the account from a list.
- After the user has responded to the popup, the job is released to the printer.

You can read more about the account selection process and shared accounts at Chapter 8, *Shared Accounts*.

The account selection popup option is enabled at the user level. Once the option is enabled, the user *must* run the client software. If the client software is not running, the popup cannot display, and the job will remain paused in the print queue. This option is hence considered high impact. You are presented with two strategies that allow you to choose the implementation approach that best suits your needs:

2.4.4.6.1. Minimal impact (Initial single user testing)

In this strategy the account popup is only initially enabled on a single user for testing. You need to nominate the testing account. You may already have an appropriate test user account on your system/domain or alternatively selecting your own personal account is a good choice. The name should be in the format used to log into the domain/system (usually the short form).

The minimal impact strategy will give you time to test the popup with the nominated test user Then the **Advanced account selection popup** option can be enabled for other users when appropriate.

2.4.4.6.2. Immediate implementation (Enable for all users)

This strategy enables the account selection popup on all users. This option is good for smaller networks as it minimizes the amount of post-install configuration - just deploy the client and your up! If this option is selected you should be in a position to install the client software on user desktops as soon as possible.

If in doubt, select the minimal impact strategy. This will ensure the impact is isolated to only the nominated test user.

2.4.4.7. Wizard Completion

After completing the configuration wizard you will be presented with a user synchronization status screen and an option to **Login**. Take some time to log in and browse the interface. There are many options and now is a good time to have a look at some of the key areas of the application. Take some time to explore!

2.4.5. Step 5 - Printer Configuration

Unlike Windows and Mac with single print system environments, Linux is a more complex environment with a choice of print system implementations. At this stage some manual printer configuration is required. Please see Section 21.1.3, “Linux Print Queue Integration” and follow the steps for integrating with the print queues in your environment before returning to this section and following on with the next step.

Printers hosted a machine other than the Print-Limit Pro server will require additional installation steps to be configured as 'secondary' servers. Please see Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers* for details.

2.4.6. Step 6 - Sharing Client Software

The Print-Limit Pro client software is located in the directory `[app-path]/client`. It may be useful to share this directory over the network so workstations can access/install the client application. Common sharing methods include:

- Samba - used to share files to Windows based workstations. Mac OS X Server tools such as the Workgroup Manager or other 3rd party tools such as SharePoint may help with sharing the client directory via Samba. Similar GUI tools exist on Linux.

  Advanced system administrators may be comfortable sharing this directory by hand-editing the `/etc/smb.conf` file. The following configuration will share the directory in read-only form:

```
[pcclient]
   path = /home/printlimit/client
   comment = Print-Limit Client
   public = yes
   only guest = yes
   read only = yes
```

- NFS - a popular sharing method used for Linux/Unix based workstations.

2.4.7. Step 7 - Testing

It is now time to test the system, please see Section 2.5, “Testing the Installation”.

2.4.8. Step 8 - Deployment for a Professional (Client Billing) Installation

NOTE: This step is a requirement for a Professional (Client Billing) installation.

Now that the system is tested and working, it is time to deploy the client software and enable the account popup for their use. It is important to deploy the client software before enabling the popup, otherwise users' printing will be stopped/paused.

2.4.8.1. Deploy the client software

As discussed earlier in the chapter the client can be run directly from a network share (which is automatically configured on Windows). There is also the option to install the software locally on each workstation, however this is not usually recommended because it makes the process of updating the client software more complicated.

Client deployment options and instruction are discussed in detail in Section 5.2.1, “User Client Deployment”. Follow those instructions to deploy the client software, and then enable the popup as described below.

2.4.8.2. Enable the advanced client popup

Once the client software is deployed on user workstations, the **Account Selection** can be set. In a Professional (Client Billing) configuration, all users that print jobs for clients are often given the Advanced account selection popup, however, other **Account Selection** options may be better suited for some users based on their job function. The popup can be enabled on one user at a time or can be updated for all users in bulk. The user details page can be used to enable the popup for a single user. To enable the popup for all users in bulk:

1. Log into the admin interface.
2. Under the **Users** section, select the **Bulk user actions...** action from the menu at the top left of the **Users** tab.
3. Select the target group. To enable for all users select the `[All Users]` group.
4. In the **Change account selection setting** section, enable the **Change account selection** option.
5. Select the **Show the advanced account selection popup** option from the list.
6. If you do not want to allow users to charge printing to their personal account, then disable the **Allow user to charge to their personal account** option.
7. Press the **OK** button, and confirm the operation. Once completed, the selected users will have the account popup enabled.

Once the popup has been enabled on all users some testing should be performed from users' desktops. To test, login to the user workstation, perform a print, and check that the account popup appears and the job is logged as expected.

2.4.9. What next?

This concludes the Install Guide. You may like to take some time to explore the features of Print-Limit Pro before continuing reading at Chapter 3, *Implementation by Example* or Chapter 4, *Quick Tour*. Business users may be particularly interested in trying the popup client software as covered in Section 4.5, “Client Software”. If desired, the client software should also be deployed to other workstations. This procedure is detailed in Section 5.2, “User Client”.

2.5. Testing the Installation

Once the installation is complete, it is now time to test the system.

2.5.1. Testing for an Education or Small/Medium Enterprise Installation:

1. Print a test document such as a web page or basic document.
2. Navigate to the printer section and select the Print Log tab.
3. Navigate to the **Printers** → **Print Log** tab.
4. Your print job should now be listed in the log.
5. Your user account should also be charged an appropriate amount.

2.5.2. Testing for a Professional (Client Billing) Installation:

1. Log into the admin interface after completing the configuration wizard.
2. Under the **Users** section, locate and click on your test user account. The **quick find** feature may assist here.
3. Ensure that the user has the **Account Selection** option set to **Show the advanced account selection popup**.

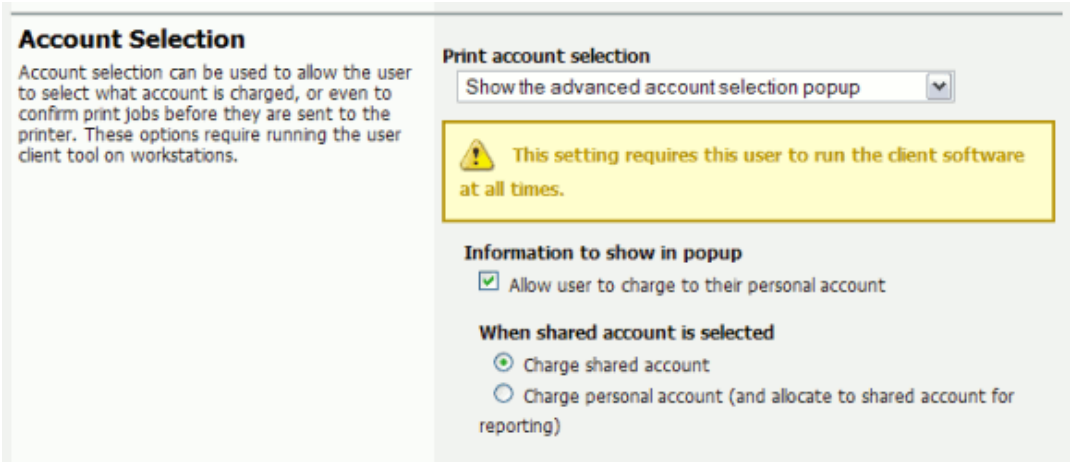

Account Selection
Account selection can be used to allow the user to select what account is charged, or even to confirm print jobs before they are sent to the printer. These options require running the user client tool on workstations.
Print account selection
Show the advanced account selection popup
This setting requires this user to run the client software at all times.
Information to show in popup
Allow user to charge to their personal account
When shared account is selected
Charge shared account
Charge personal account (and allocate to shared account for reporting)

Figure 2.14. Ensure the advanced popup is enabled

Now we need to log onto a workstation, start the client and test printing. The following instructions assume testing is performed from a Windows desktop system. For other platforms please consult the client deployment process as explained in Section 5.2, “User Client”.

1. Log onto a workstation and open Windows Explorer (the file explorer). In the address bar enter:

   ```
   \\[server-name]\PCClient
   ```

   Where `[server-name]` is the hostname of the system you installed Print-Limit on. Explorer should connect to the share containing the client software.
2. Browse into the `win` directory and double-click `pc-client.exe`. The client should launch and an icon should appear in the task tray.
3. Print a test document such as a web page or basic document.
4. The client popup window should display. Select **My Personal Account**.

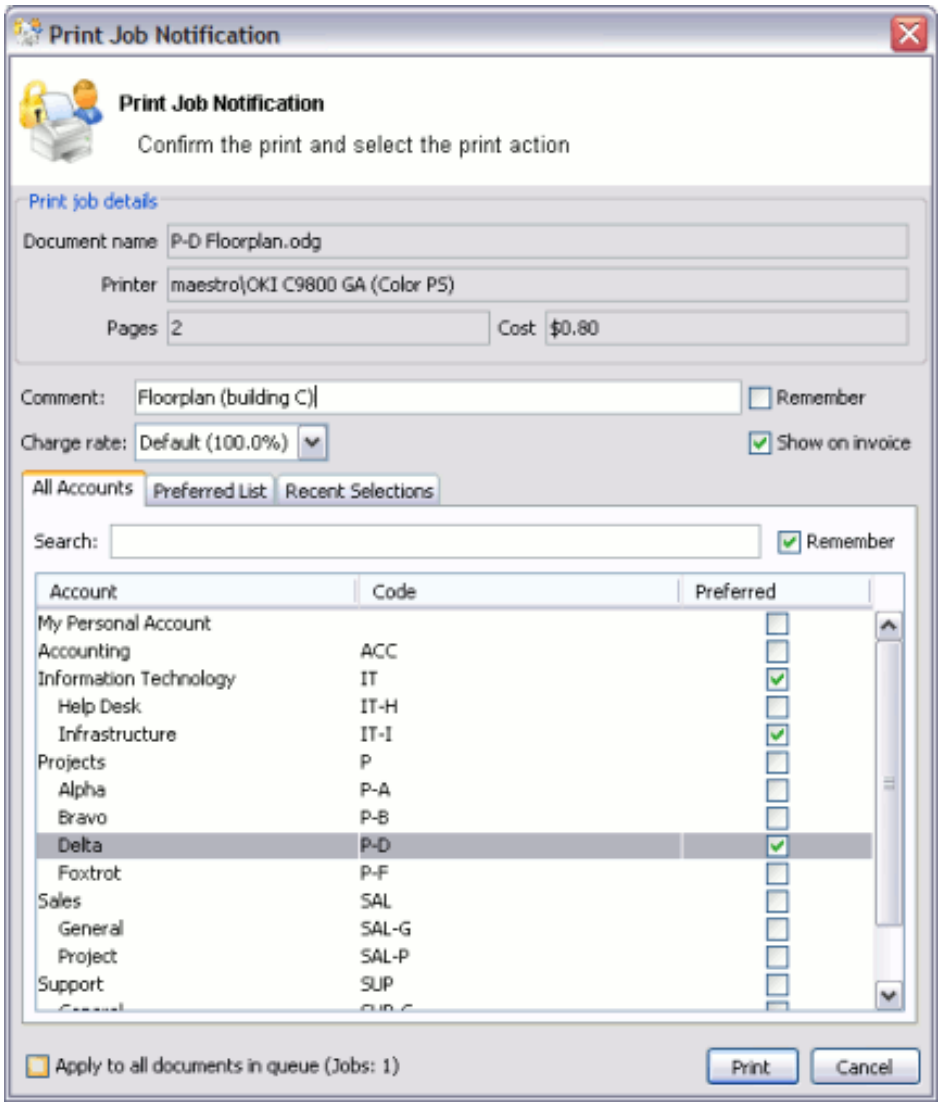


Figure 2.15. The account selection popup (displaying extra accounts)

5. Back in the Print-Limit Pro server admin interface, navigate to the **Printers** → **Print Log** tab.
6. Your print job should now be listed in the log.
7. Your personal user account should also be charged an appropriate amount.

Chapter 3. Implementation by Example

Print-Limit Pro is a feature-packed application designed to meet the print management requirements of all types of organizations. It's unlikely that any single organization would use or need all the features in Print-Limit Pro. The key to a successful implementation is with identifying the features that are most needed, and utilizing them in the correct manner.

This chapter covers common implementation scenarios in a case study form. It discusses the requirements common to the scenario, and how these requirements are satisfied using key features. The aim of this chapter is to guide implementers towards identifying and utilizing the most appropriate features.

Locate the scenario that's the closest fit to your organization. It may also be beneficial to read other scenarios that might apply to your situation. For example, a large business may benefit from some of the ideas presented in the small business case and so on.

3.1. Scenario: The Small School

Fast River School has a student population of 200 and caters to students in Kindergarten through 6th grade. A teacher is responsible for each class. The school has a two computers in each class room and a small computer lab for older students. All computers are networked. A single server acts as a domain controller and a file and print server. The students in each year level log on to the computers using the username and password allocated to their class.

3.1.1. Requirements

1. Each grade level has a monthly printing budget of $50.
2. If the budget is exceeded, teachers may discuss additional funding with the school principal.
3. Student use of color printers should be approved by teachers.
4. The teacher for each grade level should have access to activity reports in order to track the class's printing volume.
5. The school principal needs a summary report of class printing activity at the end of each semester.

3.1.2. Implementation

3.1.2.1. Initial Installation

Print-Limit Pro should be installed on the school's file and print server. The initial installation process is covered in Chapter 2, *Installation*.

3.1.2.2. Requirement 1

The monthly budget can be automated by applying a $50.00 monthly quota to the `[All Users]` group. The domain login accounts used for each year level are automatically placed in the `[All Users]` group. See the following areas for more information:

- Section 6.1, “Groups in Print-Limit Pro”
- Section 6.2, “Setting up quota allocations”

3.1.2.3. Requirement 2

Teachers can be warned when their class's balance has reached a low balance limit. The notification can be via email. The notification option is located under: **Options** → **Notifications** → **Low Balance Notifications**. Enable the email option for email notifications.

3.1.2.4. Requirement 3

The system administrator can set up the printers so only selected users (i.e. teachers) can approve jobs issued to color printers. By selecting the **Only managers can release** option on a given printer, jobs are held in a queue. Teachers can then approve the student print jobs by accessing the web based release software accessed via the URL:

```
http://server_name:9191/release
```

Where `server_name` is the name of the organization's print server.

3.1.2.5. Requirement 4

Teachers can view print activity and account balance by connecting a web browser to:

```
http://server_name:9191/user
```

Where `server_name` is the name of the organization's print server. Access to the end-user pages is covered in Section 4.6, “Interface Levels”.

3.1.2.6. Requirement 5

Summary reports can quickly be generated by any user with Print-Limit Pro's system administrator access. Granting administrator access and running reports is discussed in Section 4.7, “Assigning Administrator Level Access”.

3.2. Scenario: The Large School

North Shore High has a student population of 2000 students. Their network consists of:

- Three student Windows PC labs and one Macintosh lab with other computers scattered around the school for student use.
- A mixture of Mac and Windows laptops used by staff.
- A Windows Active Directory environment hosted on a number of servers.
- Printers are hosted on two separate Windows servers.
- Some teaching staff have desktop printers attached locally to their workstations.
- Each lab has a black and white laser printer.
- Two high-end color copier/printers and large format printers are located in a print room situated away from the computer labs.

Students have their own login account and small home directories for storage.

3.2.1. Requirements

1. The system must support the mixed Mac and Windows environment.
2. The system should support multiple print servers and locally attached desktop printers.
3. The school would like to experiment with hosting printers on a Linux system with the aim of using Linux for print serving tasks to help save on future Windows licensing costs.
4. Students are to be granted a small $5 a month printing budget. Final year students have a $10 a month allowance.
5. If students need additional printing, they must purchase it. The payment process should be simple and easy to manage.
6. Jobs issued to printers situated in the print room should be held in a queue and only printed on the physical printers after the user has arrived at the room to collect the job.
7. Staff members should have the option of charging printing to department accounts or to a small personal

account, depending on the type of print job.

3.2.2. Implementation

3.2.2.1. Initial Installation

The mixture of operating systems and multiple-servers makes this a complex installation. Prior to deployment, it is advisable for the network manager and/or network administrator to plan the deployment and familiarize themselves with the Print-Limit Pro software.

3.2.2.2. Requirement 1

Print-Limit Pro is a cross platform solution designed for all major operating systems. Given the existence of an existing domain environment, the installation of Windows systems is typically straightforward. The Macs however can be set up in a number of different ways. Network administrators should consult Chapter 23, *Mac Printing in Detail*.

3.2.2.3. Requirement 2

Multi-server installations are commonplace on larger networks. One system needs to be nominated as the primary Print-Limit Pro server. This system is responsible for running the "brains" of the system and storing all data. The other servers, *secondary servers*, report back to the central primary server via XML Web Services. The system architecture, deployment considerations, and recommendations are outlined in Section 14.5, “Multiple Print Servers”.

3.2.2.4. Requirement 3

Linux is becoming ever popular in the server space. First web hosting, and now common file and print services are being serviced with the Linux operating system. Print-Limit Pro is available for Windows, Mac and Linux systems. Not only that, its architecture allows all three systems to run side-by-side sharing a common central server. This school may experiment with hosting printers on Linux by running a Linux based secondary server alongside their main Windows servers. See Section 14.3, “Configuring a Linux or Novell iPrint Secondary Print Server” for additional information.

3.2.2.5. Requirement 4

Quotas or allowances are allocated to users on a per-group basis. By adding network domain groups to Print-Limit Pro that represent the respective student groups, system administrators can automate the allocation process. See Section 6.2, “Setting up quota allocations” for further information.

3.2.2.6. Requirement 5

The purchase of additional quota/credit is best managed by the PrintCard system. The system reduces the data entry and management requirements associated with manual transactions. More information on PrintCards is covered in Chapter 13, *PrintCards*.

3.2.2.7. Requirement 6

Print release in the print room is best achieved with the release station. By running a special full-screen application on a dedicated terminal in this room, students can release their jobs once they arrive at the room. The release station and secure printing in general is covered in detail at Chapter 10, *Hold/Release Queues & Print Release Stations*.

3.2.2.8. Requirement 7

Tracking and allocating staff printing to departments is best achieved by using Shared Accounts. When set up, teaching staff are presented with a popup window asking them to select an account to charge. Account access can be controlled via domain group membership or via PINs. More information on shared accounts is available at Chapter 8, *Shared Accounts*.

3.3. Scenario: The University

West Face University has a student population of 10,000 full-time students and off-campus and part-time students. IT services centrally control the network, however individual faculties and departments also offer and manage some of the specialist IT infrastructure. All major operating systems are in used on both the workstations and servers.

3.3.1. Requirements

1. Centrally managed printers are hosted in a clustered print server environment. The solution needs to support clustering.
2. IT services wants to provide the option for department labs to also have their printers controlled via the central system.
3. Client software needs to be optional. It would be preferable for students to have access to their account details via a web browser.
4. The design of the web interface should be customizable.
5. The system must be secure and support SSL-based encryption.
6. The system should run on top of a database system and allow data access to facilitate custom reports using packages such as Crystal Reports.

3.3.2. Implementation

3.3.2.1. Initial Installation

University-wide deployments can be quite involved. Most large universities that have deployed Print-Limit Pro have worked closely with the Print-Limit Pro development team during implementation. A lot can be gained by arranging a teleconference or similar with the development team. We're always happy to help our larger customers deploy the ideal solution.

3.3.2.2. Requirement 1

Print-Limit Pro supports clustering at all application layers including the print server, the database server, and the application server on both Microsoft Windows and Linux. Setting up Print-Limit Pro in Microsoft Clustering Services is covered in Chapter 20, *Clustering and High Availability*. The Print-Limit Pro development team has experience using Linux-HA (High-Availability Linux) and other tools to support customers who use Linux.

3.3.2.3. Requirement 2

Printers and labs hosted by individual faculties and departments outside the central IT services area can optionally be joined into the campus-wide system via Print-Limit Pro's secondary server support. Central IT staff can approve these secondary servers via IP address and grant selected staff administrator level access to the system's admin web interface on a case-by-case basis. See Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers* for more information on secondary servers.

3.3.2.4. Requirement 3

Print-Limit Pro's client software is optional in a basic charging/quota environment. Users can access their accounts and view their account balance, transaction and printing history, and use advanced tools such as PrintCards and transfers. More information on the web-based users tools is available at Section 4.6, “Interface Levels”.

3.3.2.5. Requirement 4

The design and layout of the end-user web interface can quickly be changed using HTML and Cascading Style Sheets. Customizing the end-user web design is covered in Section 15.3, “Customizing the User web pages”.

3.3.2.6. Requirement 5

Print-Limit Pro provides secure connections for report access and administration via SSL-based encryption. Larger universities often have their own certificate signing procedure for SSL based servers. Print-Limit Pro can even accept these signed certificates. SSL-based encryption is set up by default and is accessed via a URL such as:

```
https://[server_name]:9192/admin
```

Information on using a custom SSL certificate is covered in Section A.4, “SSL/HTTPS Key Generation”.

3.3.2.7. Requirement 6

Hosting the Print-Limit Pro system on top of an external database system such as Microsoft's SQL Server offers a number of advantages including easy data access, better performance and scalability, and the ability to take advantage of existing backup processes. More information on external RDMS support is available at Chapter 18, *Deployment on an External Database (RDBMS)*.

The data structure is simple and administrators with report writing skills will quickly be able to access the data for custom reporting via tools such as MS Access or Crystal Reports.

3.4. Scenario: The Small Business

Northwoods Inc. is a small twelve-person Engineering and Architect Drafting office serving the local area. Their network consists of a mix of Windows XP and Windows Vista workstations connected on a Workgroup based network. Wireless network access is also provided to employees with laptops. Most staff work on a project basis and there is a need to track use by project code and sub-project. Some staff work on a freelance basis and management would like to track and charge for color printer use on a monthly basis.

3.4.1. Requirements

1. The system must be easy to set up and maintain as there is no full-time IT staff.
2. The system must work in a Windows workgroup environment.
3. Staff are to have unlimited access (i.e. no budgets).
4. Staff need to allocate their printing to projects and cost centers so printing and drafting costs can be passed back onto the clients (chargeback).
5. Managers need access to view real-time reports.
6. Data should be able to be exported to Excel on a monthly basis for billing.

3.4.2. Implementation

3.4.2.1. Initial Installation

One system on the network needs to be allocated the task of hosting the printer and the Print-Limit Pro application. Users will print via this system so it needs to be left on most for most of the time. An existing file server is ideal, however someone's desktop system will also suffice (must be left on at all times).

3.4.2.2. Requirement 1

Print-Limit Pro is well known for its ease-of-use. It is a self-maintaining system with a simple to use web-based interface. Apart from the initial set up, and the recommendation to incorporate the application's data into a backup procedure, no further technical administration and support is required.

3.4.2.3. Requirement 2

Workgroup environments are common on small networks. They differ from a domain environment in that they are not centrally authenticated via a server. Users may use a system that automatically logs in as "a user" or maybe they just log in locally on their workstations. See Chapter 24, *Running in a Workgroup Environment* for more information on the ways in which Print-Limit Pro can be installed in a workgroup environment.

3.4.2.4. Requirement 3

All users can be set up as "unrestricted". In this mode, users can start of with a zero balance and count down as

they print. Their balance indicates their printing value to date.

3.4.2.5. Requirement 4

Shared accounts can be created to represent the current projects with sub-accounts used to represent areas under these projects (sub-projects). The client popup software can be enabled on user accounts forcing users to allocate printing to the project/client. In addition, the advanced client popup will allow premiums to be charged for special printing such as reporduction of expensive mylar film.

Selected staff can run monthly or quarterly invoice reports at any time to quickly determine printing associated with a given client/project. More information on shared accounts and reporting can be found in Chapter 8, *Shared Accounts*.

3.4.2.6. Requirement 5

Print-Limit Pro records data in real-time. Full print logs and reports are available at any time and can be accessed using a standard web browser. The manager can log into the administration interface and access the reports at any time.

3.4.2.7. Requirement 6

All reports and activity lists can be exported to Microsoft Excel. To access the Excel data, click on the small Excel icon located next to the report name, or the icon at the bottom of the print log.

3.5. Scenario: The Medium to Large Business

SandComp is a large manufacturing company consisting of 3000 employees spread over 4 sites. All sites are connected via a fast Wide Area Network (WAN). Printers are hosted on local servers with the largest site hosting printers in a Microsoft Cluster environment.

3.5.1. Requirements

1. Must support a Microsoft Cluster environment.
2. Must centrally store print data on a server located at the main office.
3. Must not cause disruption if the WAN link goes down between offices.
4. The consulting division needs to be able to track printing by project (client/matter format) so costs can be passed back to their clients.
5. The finance department needs secure print release on their shared printers stored in the utility room.

3.5.2. Implementation

3.5.2.1. Initial Installation

The implementation of Print-Limit Pro in this environment would best be managed using staggered or step-by-step approach. First, the software should be installed and tested on the central offices' clustered environment, then rolled out to the other offices, and finally the secure printing and client popups should be implemented. A staggered approach is likely to minimize disruption allowing network administrators to focus on the tasks at hand.

3.5.2.2. Requirement 1

Print-Limit Pro supports Microsoft Clustering Services. The installation process is documented at Chapter 20, *Clustering and High Availability*.

3.5.2.3. Requirement 2

The print servers at the remote locations can be installed as *secondary servers* reporting back to the primary server. All data will be stored in one location. The services communicate using XML Web Services and only consume a few bytes per print job. Hence the system will work well over the WAN.

3.5.2.4. Requirement 3

Print-Limit Pro has a *fail-open* design. This means that if a failure occurs, such as the network fails between servers, printing will continue as normal.

3.5.2.5. Requirement 4

The consulting division can make use of the share accounts feature to track their printing by client. More information on shared accounts is available in Chapter 8, *Shared Accounts*. These advanced users would benefit from using the advanced popup. The advanced popup offers advanced searching features allowing end-users to quickly located the appropriate account and enter job comments as required.

3.5.2.6. Requirement 5

Secured print release can be facilitated by setting up a terminal (a low-end PC will do) in the finance department's utility room. When a member of the finance department prints to a shared printer, their document will hold in the queue until that member goes to the utility room and releases the print job with his or her username and password. This process ensures that documents stay secure and can't be "accidentally" collected by other people.

3.6. Scenario: The Public Library or Internet Cafe/Kiosk

The Sandy Beach Cafe is a typical Internet cafe offering Internet access, faxing, printing and other services. This business has 50 computers and two printers. A black & white laser printer called "Black and White Printer" and a high-end color inkjet system named as "Color Printer". They would like to implement a pay-per-print system that meets the following process and requirements:

3.6.1. Requirements

1. The customer prints the job to the appropriate printer.
2. At the front desk, the customer pays a staff member for the print job.
3. The staff member releases the job for printing.
4. The customer collects the print job.

3.6.2. Implementation

Print-Limit Pro's hold/release queues are ideally suited to the Internet cafe scenario. More information on the hold/release queues are available at Chapter 10, *Hold/Release Queues & Print Release Stations*. Print-Limit Pro provides both an application interface for *release station managers* (i.e. desk staff) as well as a convenient web browser-based interface. To summarize a typical implementation:

1. The Print-Limit Pro server software is installed on the system hosting the printers. An existing server or desktop system will suffice.
2. Workstations are configured to print to the printers shared on the system set up in step 1.
3. Inside the Print-Limit Pro admin interface, the printers should have the **manager only release** option selected.
4. Desk staff can view and control pending print jobs, their cost, and other details via the web based release interface accessible at the URL:

```
http://server_name:9191/release
```

Chapter 4. Quick Tour

This section will guide you through the main areas of the application and cover some common management tasks.

4.1. Navigation

Before we jump in and start our tour of Print-Limit Pro it is important to take some time to understand the application's navigation tools. The subsequent sections detail the major user interface elements.

4.1.1. Tabs

Figure 4.1. Application navigation tabs

Application areas are grouped into tabs that logically separate parts of the system. Selecting a tab displays the controls and information related to that area. Users will be familiar with the concept of tabs from many other applications.

4.1.2. Actions

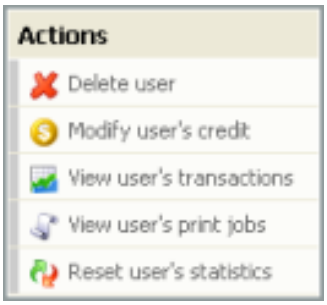


Figure 4.2. The Actions area. Click to perform the action.

Throughout the application, the *Actions* area lists a number of tasks or actions that can be performed. The Actions list is always located in the top left-hand corner of the application window. Actions are adaptive and the list of actions changes depending on the area of the application being viewed.

4.1.3. Buttons

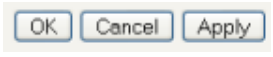


Figure 4.3. Buttons to validate and save settings

Changes made to options, user settings or configurations are only validated and applied after submitting the change. Screens that you can save in the application will have the following buttons located at the bottom:

- **Apply** - Validate and save the changes and return to this location/object
- **OK** - Validate and save the changes and return to the data list ready to select and edit another object.
- **Cancel** - Don't save and changes.

4.1.4. Crumb Trail

Figure 4.4. The crumb trail highlighting the location

The crumb trail serves two purposes. It maps out the navigation path followed by the user and provides a way to navigate up (back) the navigation path. For example, while editing a user's account, the crumb trail provides a hyperlink up one level back to the **User List**.

4.1.5. Status Messages

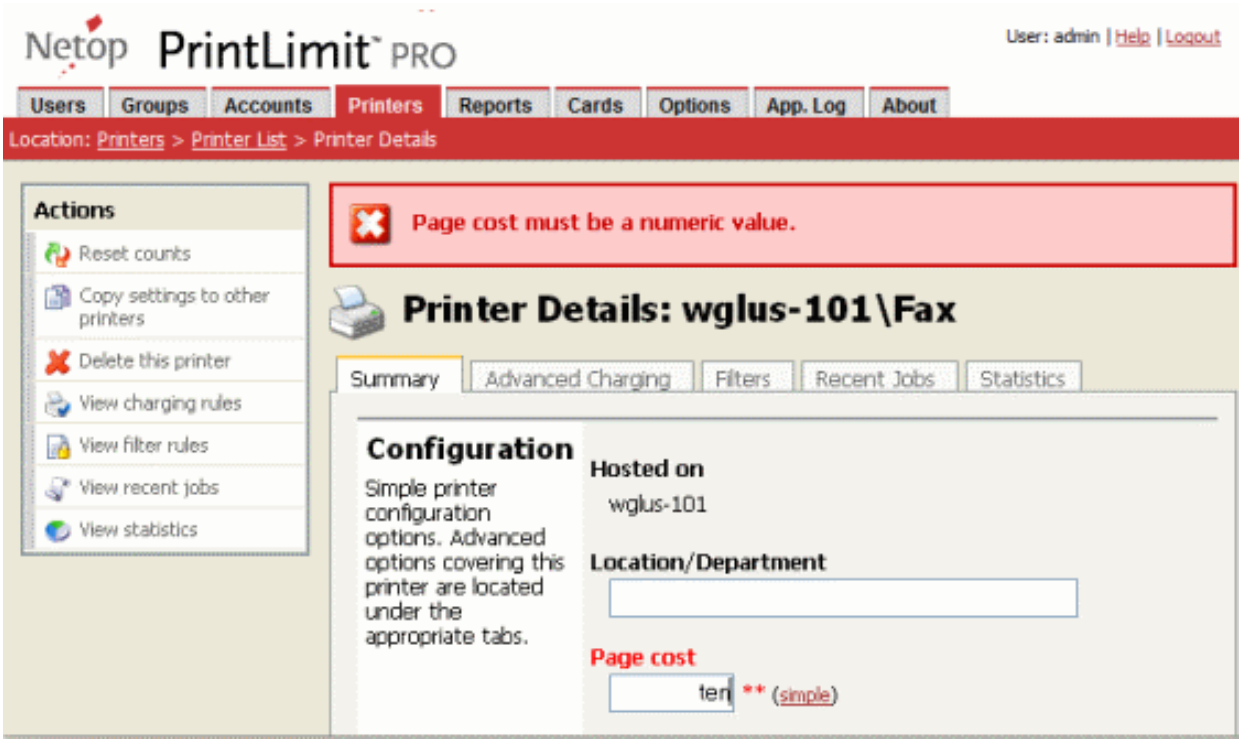


Figure 4.5. A red status message indicating a validation error

Important status messages are displayed in the top section of the application window. Messages relating to an error or requiring user intervention are displayed in red. Standard messages are displayed in green and cautions in yellow.

4.1.6. Fields

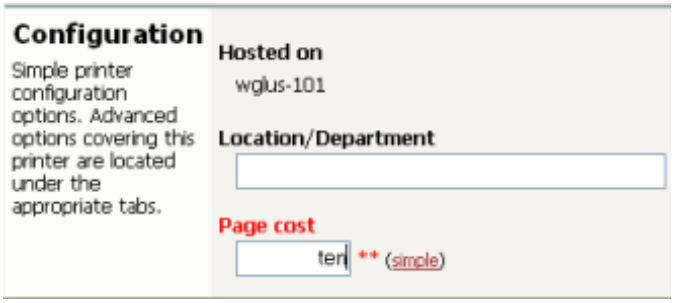


Figure 4.6. A field highlighted indicating a validation error

Configuring printers, users or settings are often done via text fields. Changes made to fields are validated after pressing **OK** or **Apply** buttons. If the field fails validation, the offending data is marked with a red asterisk. Typical validation errors include invalid number or currency formats.

4.2. Sections

The Print-Limit Pro administration interface is grouped into task oriented sections. These are denoted by the tabs at the top of the screen. The sections are:

Figure 4.7. Application navigation tabs

4.2.1. Dashboard

- The What's next? gadget provides tips for new users.
- The System Status gadget provides a list of system statistics.
- The Pages Printed graph shows a running history of the daily pages printed over the past 30 days.
- The Environmental Impact gadget provides environmental impact statistics.
- The Printer Status gadget displays daily pages printed and device status per printer.
- The News gadget has links to the latest information about release and development activity at Print-Limit.
- The Real-time Activity gadget is a scrolling summary of Print-Limit events with expandable details.
- Related sections:
  - Section 12.2, “The Dashboard”

4.2.2. Users

- View a list of all users
- View and change a user's credit balance
- View a user's statistics and charts
- List a user's printing activity
- Change user privileges and settings
- Related sections:

- Section 4.3, “Basic User Operations”
- Chapter 6, *Advanced User Management*

4.2.3. Groups

- Add/Remove domain or network groups required for user management
- Define rules controlling how new users are created
- Perform bulk user operations
- Control user quota allocations
- Related sections:
  - Section 6.1, “Groups in Print-Limit Pro”
  - Chapter 6, *Advanced User Management*

4.2.4. Accounts

- View, edit and create shared accounts
- View and change the shared accounts credit balance
- List all charges against shared accounts
- Set account access security
- Related sections:
  - Chapter 8, *Shared Accounts*
  - Section 5.2, “User Client”

4.2.5. Printers

- View and edit printer costs and settings
- Define printer filter rules and restrictions
- View all recent print jobs
- View printer statistics and charts
- Related sections:
  - Section 4.4, “Basic Printer Operations”
  - Chapter 7, *Advanced Printer Management*

4.2.6. Reports

- Access to standard reports for viewing, export and printing
- Run “one click” reports for quick overviews
- Run reports over Ad-hoc date ranges
- Related sections:
  - Section 4.8, “Charting, Statistics, Reports and Logs”
  - Chapter 9, *Reports*

4.2.7. Cards

- Managed PrintCards
- View card use and activity
- Download and install the card creation wizard
- Import new cards
- Related sections:
  - Chapter 13, *PrintCards*

4.2.8. Options

- Access general system settings
- Control administrator access and security
- Perform network user and group synchronization tasks
- Perform backup snapshots
- Related sections:
  - Chapter 12, *System Management*
  - Appendix A, *Tools - database, server-command scripting, and APIs (Advanced)*

4.2.9. Application Log

- View system audit, security and application events
- Related sections:
  - Chapter 12, *System Management*

4.2.10. About

- List version and build information
- Access update news
- Install and view license information
- Related sections:
  - Chapter 17, *Licensing and Support*

4.3. Basic User Operations

The user section is dedicated to user management. Common user oriented tasks include assigning additional credit to users, viewing a user's activity, and controlling user privileges.

Users in Print-Limit Pro can be assigned either:

- Restricted access where access to resources is denied once their credit drops to zero (or to the overdraft limit).
- Unrestricted access meaning the user is never denied access.

To change a user's restriction privileges:

1. Log in as the built-in `admin` user.
2. Click on the **Users** section.
3. Select the user from the list (or enter the user name in the quick find).
4. Scroll down to the **Account Details** section.
5. Click on the **Restricted** checkbox.
6. Click on the **Apply** button to save the change. A save success message will appear.

To increase a user's account balance by $10.00:

1. Select the user from the list (or enter the user name in the quick find).
2. Select the **Adjustments and Charges** tab.
3. Enter `$10.00` in the adjustment field.
4. Enter a comment to associate with the transaction.
5. Click the **Apply** button.

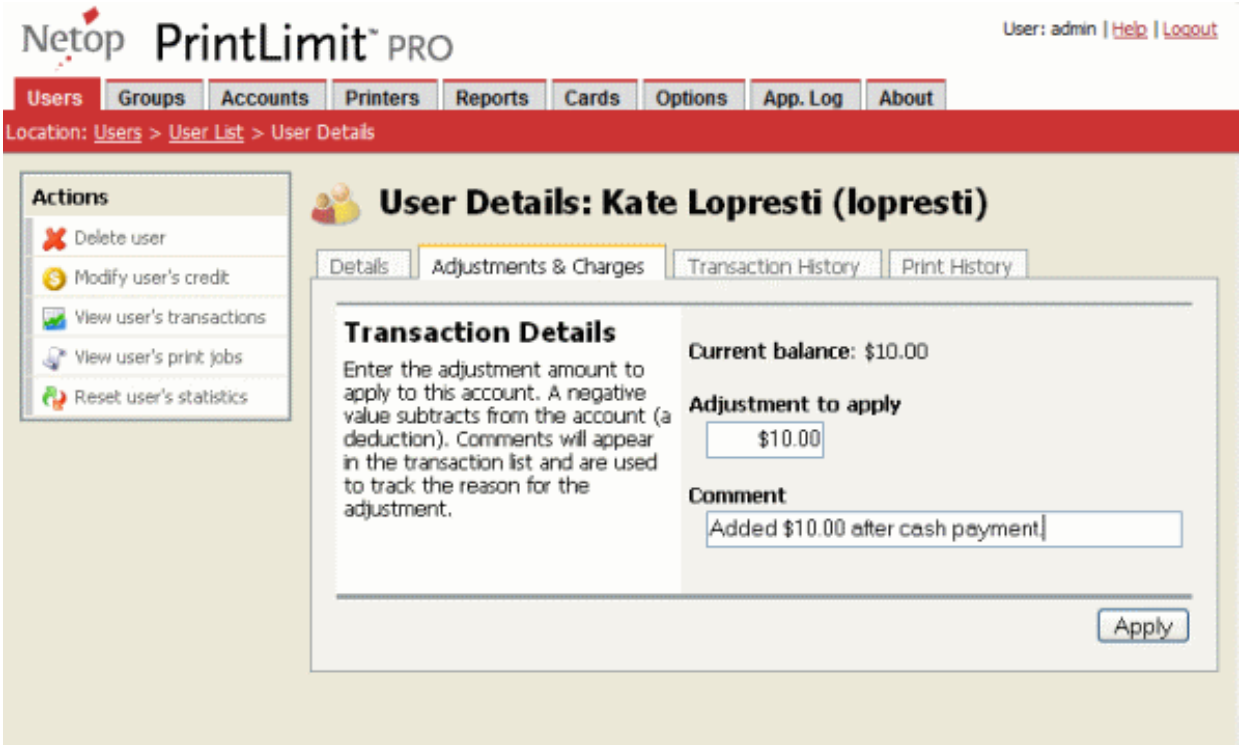


Figure 4.8. Adjusting a user's credit up $10.00

To view a user's transaction and print history:

1. Select the user from the list (or enter the user name in the quick find).
2. Select the **Transaction History** tab to view the user's transaction.
3. Select the **Job Log** tab to view the user's recent print activity.

4.4. Basic Printer Operations

All printers managed by Print-Limit Pro are configured under the Printers section. Printer configuration may include:

- Setting a cost-per-pages or defining more complex charging rules.
- Defining advanced filter and restriction rules. For example, configuring a printer to deny jobs of a selected size or automatically removing duplicate documents.
- Controlling the enabled/disabled status via time-latches.

To define a basic cost-per-page of $0.10:

1. Log in as the build-in `admin` user.
2. Select the **Printers** section.
3. Click on the printer who's page cost is to be defined.
4. Enter a page cost of `$0.10` under the configuration section.
5. Press the **Apply** button to save the change.

To define an advanced cost model offering a 40% discount for duplex (double sided) printing:

1. Under the **Printers** section, select the printer whose cost model is to be modified.
2. Click on the **Advanced Charging** tab.
3. Select a charge type of **by category**.
4. Enter 40% in the duplex discount field and select **Percent less** from the dropdown list.
5. Click the **Apply** button to save the change.

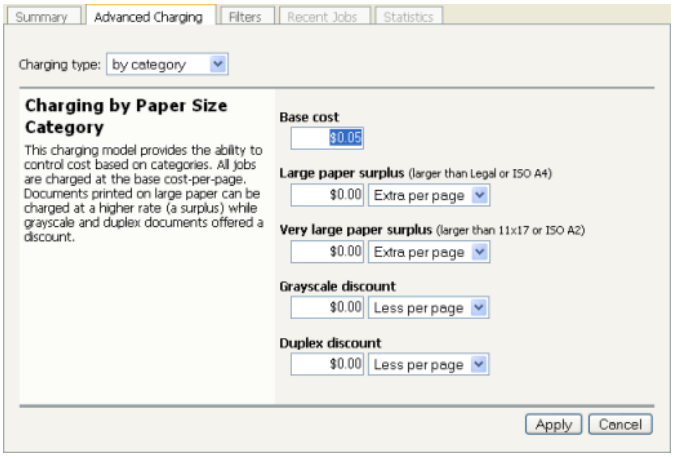

Summary
Advanced Charging
Filters
Recent Jobs
Statistics
Charging type: by category
Charging by Paper Size Category
This charging model provides the ability to control cost based on categories. All jobs are charged at the base cost-per-page. Documents printed on large paper can be charged at a higher rate (a surplus) while grayscale and duplex documents offered a discount.
Base cost
$0.05
Large paper surplus (larger than Legal or ISO A4)
$0.00 Extra per page
Very large paper surplus (larger than 11x17 or ISO A2)
$0.00 Extra per page
Grayscale discount
$0.00 Less per page
Duplex discount
$0.00 Less per page
Apply
Cancel

Figure 4.9. A 40% discount applied to double-sided printing

Filters provide administrators with access to a set of rules to control what type of documents are allowed access to the printer. Filter rules can be used for a variety of tasks such as:

- Enforcing good printing practices
- Preventing queue jamming and hogging
- Ensure printers are used for the purpose they are designed for

Filter options include:

- Control by the jobs cost
- Control by a document's page count
- Denying jobs based on their color mode
- Filtering by document name
- Automatically denying and deleting duplicate documents

Example - To apply a filter preventing jobs over 100 pages:

1. Under the **Printers** section, select the printer to which the filter should be applied.
2. Click on the **Filters** tab.
3. Scroll to the **Page Count** section.
4. Click and select the **deny jobs based on number of pages**.
5. Enter in `100` in the maximum filed.

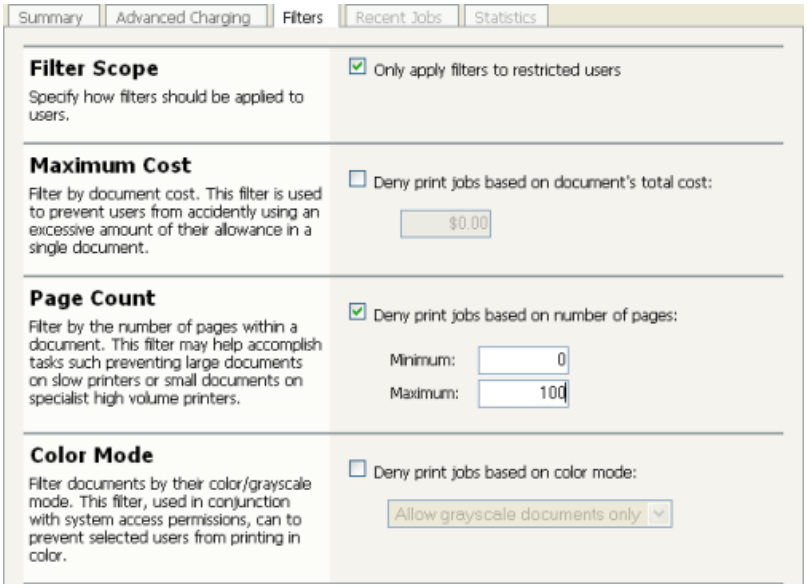

Summary
Advanced Charging
Filters
Recent Jobs
Statistics
Filter Scope
Specify how filters should be applied to users.
Only apply filters to restricted users
Maximum Cost
Filter by document cost. This filter is used to prevent users from accidently using an excessive amount of their allowance in a single document.
Deny print jobs based on document's total cost:
$0.00
Page Count
Filter by the number of pages within a document. This filter may help accomplish tasks such preventing large documents on slow printers or small documents on specialist high volume printers.
Deny print jobs based on number of pages:
Minimum:
0
Maximum:
100
Color Mode
Filter documents by their color/grayscale mode. This filter, used in conjunction with system access permissions, can to prevent selected users from printing in color.
Deny print jobs based on color mode:
Allow grayscale documents only

Figure 4.10. Printer Filters and Restrictions

To disable a printer for the next hour using a time latch:

1. Under the **Printers** section select the printer to lock or disable.
2. On the **Summary** tab, scroll to the **Configuration** section.
3. Select **Disable for next hour** from the drop-down list.
4. Click the **Apply** button to save the change.

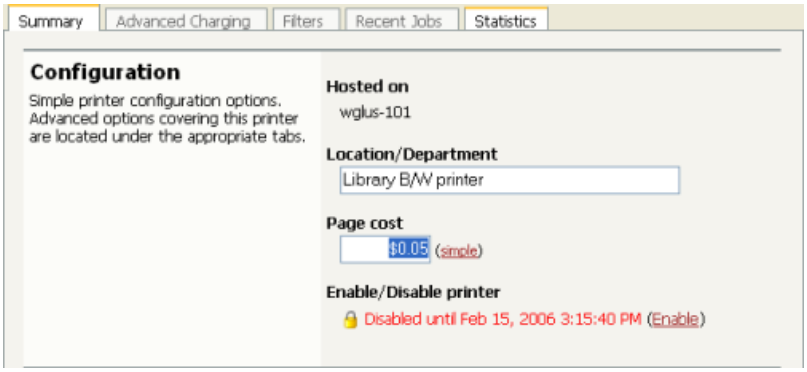


Figure 4.11. A printer disabled for 1 hour

4.5. Client Software

The client software is optional and not required for basic logging, however it does provide users with access to advanced features. These features include:

- Real-time feedback to the user including their account balances and event messages such as "print job denied" reasons.
- Access to the account selection popup so users can allocate print jobs to shared accounts - for example, accounts representing departments, projects, clients, etc. This is particularly important in a business environment.

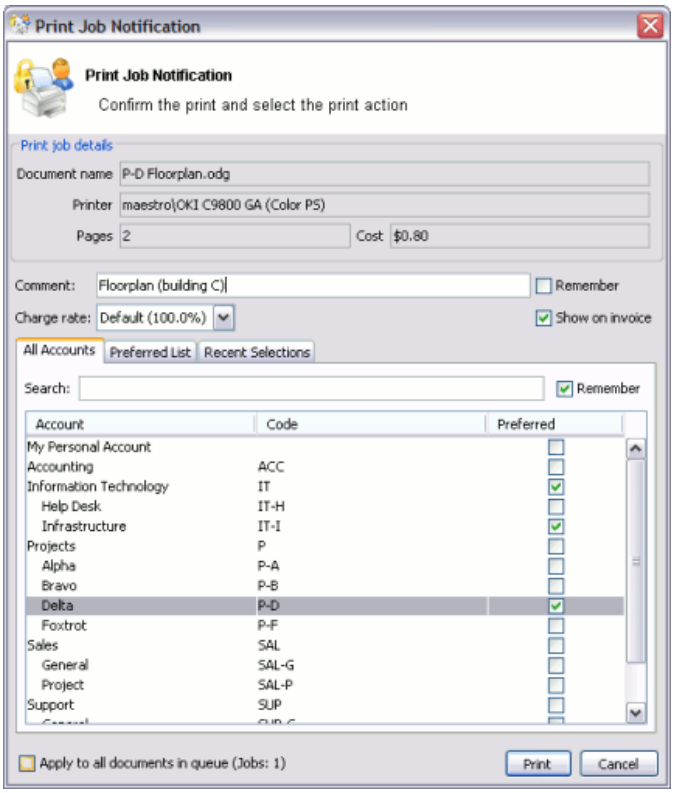


Figure 4.12. The user client displaying the "Advanced Account Selection Popup"

4.5.1. Demonstrating the client software and account selection process

Create a Shared Account:

1. Log into Print-Limit Pro as an administrator (e.g. admin account).
2. Select the **Accounts** tab.
3. Click the **Create a new account** action.
4. Enter an appropriate name for the account. For example "test account".
5. Click the **Apply** button to save the account.
6. Select the security tab and ensure the `[All Users]` group has access to the account. If not, add the group by selecting it from the drop-down and pressing **Add**.
7. See Chapter 8, *Shared Accounts* for more details about creating and managing shared accounts.

Grant account selection access to your account:

1. Select the **Users** tab.
2. Locate and click on your personal user account.
3. Under the **Account Selection** section, select the option **Show the advanced account selection popup**.
4. Print the **OK** button to save and apply changes.

Launch the client software (Windows Platform):

1. Log into a workstation using your user account as modified above (note: The server itself can also be used for this testing if desired)
2. Open **Windows Explorer** (File Explorer).
3. In the address bar, enter `\\server_name\pcclient` where `"server_name"` is the name of the server hosting the Print-Limit Pro software. This will bring up files located on the `PCClient` share.
4. Launch the `pc-client.exe` program by double-clicking on the file. An icon should appear in the task tray.
5. Print a test page (for example a web page). The advanced client popup should appear allowing you to select the "test account" set up in the preceding section.

More information about shared accounts can be found in Chapter 8, *Shared Accounts* and information about client software deployment is covered in Section 5.2, “User Client”.

4.6. Interface Levels

Print-Limit Pro provides two layers of system access, Admin and User.

4.6.1. Admin Access

Admin access provides access to the system for administration and management. This level is usually only granted to selected individuals in the organization, such as network administrators or management staff. To assign admin rights to an individual or group of users see Section 4.7, “Assigning Administrator Level Access”.

4.6.2. User Access

End users are granted access to a set of basic web pages providing them with access to:

- View their account balance
- List recent account activity
- Use tools such as PrintCards and funds transfers to other users

The User Client Tool (Print-Limit Pro User Client Software) complements the web pages by providing users with a quick view of their current account balance.

Important

Access to the user area, like the admin area, requires authentication - that is the user must enter their network username and password. Authentication is required because user information such as print history is confidential. Access to the user's funds transfer feature also needs to be protected. This is particularly important in schools. Students can rest assured that should they leave their workstation for a few minutes another student can't transfer their account balance to themselves!

To access the user pages via the User Client Tool:

1. Start the client software if it is not already running. On the server this may be started via the **Client** Start menu item. See the client software section for details on how to start this on a remote workstation or desktop.

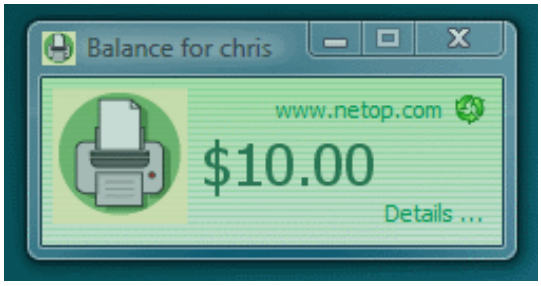


Figure 4.13. The user client tool

2. Click the **Details...** link. The web browser will open.
3. Enter your username and password and click **Login**.
4. The user page pages will display.

To access the user pages directly via a web browser:

1. Open a standard web browser.
2. Enter the URL `http://[servername]:9191/user` where `[server_name]` is the network name assigned to the system running Print-Limit Pro. The login screen will appear.
3. Enter your username and password and click **Login**.

4.7. Assigning Administrator Level Access

Print-Limit Pro sets up one administrator account called “admin”. This is the master administrator account, with access to all features, whose password is assigned during the configuration wizard. In large organizations it is likely that administrator level access will need to be granted to more than one person. One solution is to give all persons the master password; however the recommended approach is to assign administrator rights to these individual's network user accounts. The advantages of this approach are:

- They can access the administration pages using their own username and password (they don't have to remember another password!).
- Different levels of administrator access can be assigned to different users. Print-Limit Pro includes an advanced Access Control List (ACL) allowing different administrators access to different functions and areas of the application.
- Most activity is audited so changes can be sourced to an individual.

For more information see Section 12.4, “Assigning Administrator Level Access”.

4.8. Charting, Statistics, Reports and Logs

One of the key features of Print-Limit Pro is the advanced charting, statistics, reporting and logging. This information can be used by administrators to:

- Determine which printers are most used
- Spot areas where printers may be inappropriate for the task.
- View user and printer trends over time.

4.8.1. Charts

Charts are ideal for obtaining a quick visual overview. All users and printers have a line chart displaying activity over the last 30-days.

Figure 4.14. User 30-day account balance history

The Charts Tab under the Printers section hosts a set comparison charts allowing administrators to compare printers side by side.

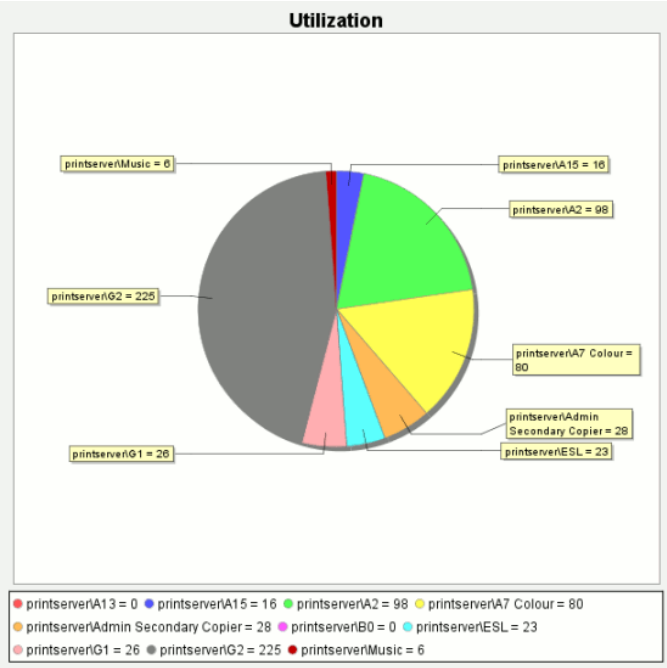


Figure 4.15. Printer utilization chart

Under each individual printer the Statistics section provides information on all jobs printed on a given printer.

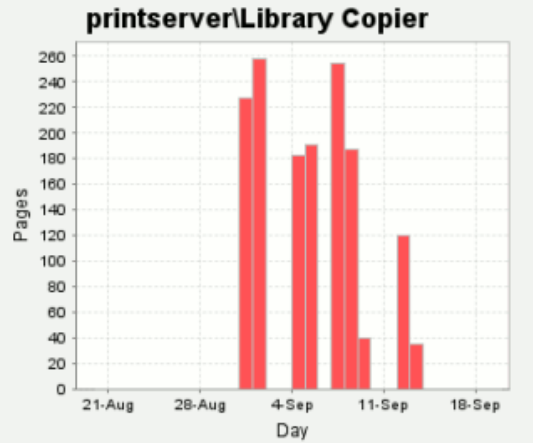


Figure 4.16. Print page history for a single printer

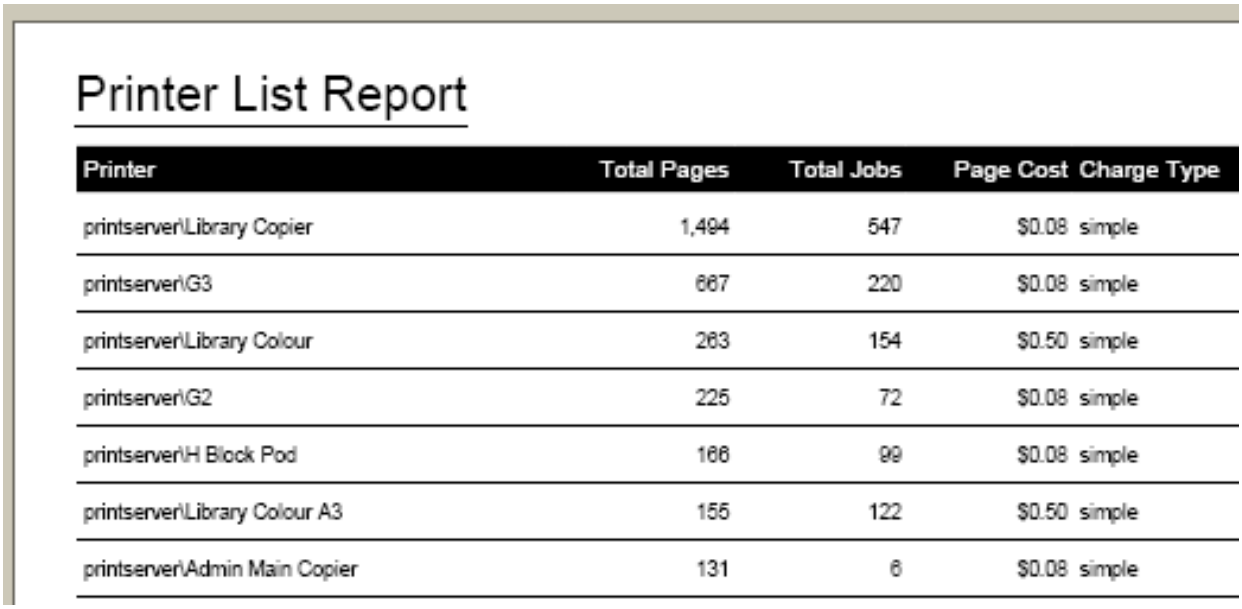
4.8.2. Reports

Reports provide a tabular data display, often in a printable format, of system information ranging from activity histories, summaries, transaction details, etc. Reports are typically run to print a summary of user activity, printer activity, or group or account activity. To streamline access to common reports, Print-Limit Pro provides a series of predefined one-click report links under the **Reports** section. Most reports can be generated over a variety of common date ranges or user defined date ranges.

Standard reports include:

- User Reports

  - Print summary statistics grouped by user
  - Quick list of the most active print users
- Printer Reports
  - Summary of print activity grouped by printer
  - Quick lists of the most active/busiest printers
- Group Reports
  - Summary of print activity grouped by network group (Note: The group needs to be defined under the Groups section.)
- Shared Account Reports
  - Summary of print activity grouped by shared account charged
- Print Log Reports
  - Detailed lists of all print jobs over a given period
  - Quick list of the largest print jobs



Printer List Report

Printer	Total Pages	Total Jobs	Page Cost	Charge Type
printserver\Library Copier	1,494	547	$0.08	simple
printserver\G3	667	220	$0.08	simple
printserver\Library Colour	263	154	$0.50	simple
printserver\G2	225	72	$0.08	simple
printserver\H Block Pod	166	99	$0.08	simple
printserver\Library Colour A3	155	122	$0.50	simple
printserver\Admin Main Copier	131	6	$0.08	simple

Figure 4.17. Printer report in PDF

Standard reports are provided in a variety of output formats including, HTML, PDF and MS Excel. PDF reports are ideal for printing. HTML versions of the reports are provided for systems without a PDF viewer.

Tip

In addition to the standard reports, administrators can run other reports on ad-hoc data by using the **Export/Print** option available under most of the data lists. This is covered further in the subsequent report section (See Chapter 9, *Reports*).

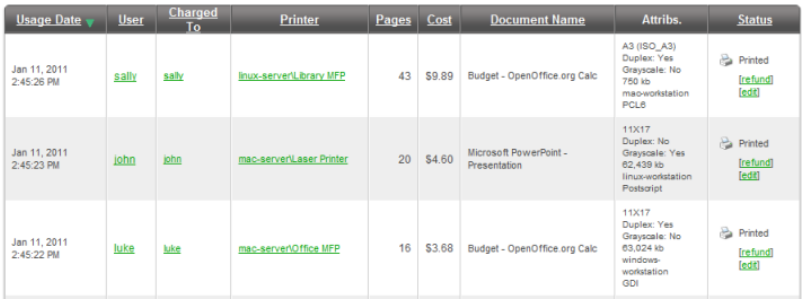
4.8.3. Logging

The Print-Limit Pro activity logging can be classed into the following areas:

4.8.3.1. Usage Logging

Usage logging records information about usage events such as printing. Information includes:

- The date of the use
- Who performed the use
- Details of the type of user including, cost and other attributes



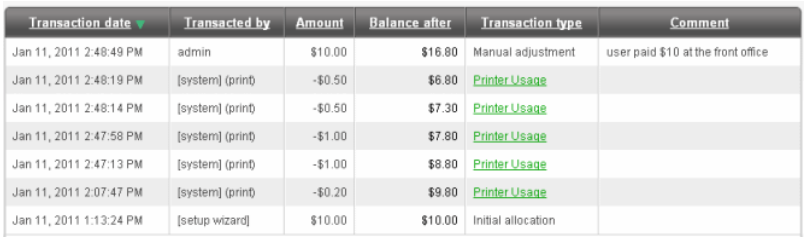
Usage Date	User	Charged To	Printer	Pages	Cost	Document Name	Attribs.	Status
Jan 11, 2011 2:45:26 PM	sally	sally	linux-server\Library MFP	43	$9.89	Budget - OpenOffice.org Calc	A3 (ISO_A3) Duplex: Yes Grayscale: No 750 kb mac-workstation PCL6	Printed [refund] [edit]
Jan 11, 2011 2:45:23 PM	john	john	mac-server\Laser Printer	20	$4.60	Microsoft PowerPoint - Presentation	11X17 Duplex: No Grayscale: Yes 62,439 kb linux-workstation Postscript	Printed [refund] [edit]
Jan 11, 2011 2:45:22 PM	luke	luke	mac-server\Office MFP	16	$3.68	Budget - OpenOffice.org Calc	11X17 Duplex: Yes Grayscale: No 63,024 kb windows-workstation GDI	Printed [refund] [edit]

Figure 4.18. Printer usage log

4.8.3.2. Transaction Logging

All modifications or deductions to an account (user or shared) are recorded in the transaction log. Information recorded includes:

- The date of the transaction
- Who performed the transaction
- Any comment or note associated with the transaction (if performed by a user)



Transaction date	Transacted by	Amount	Balance after	Transaction type	Comment
Jan 11, 2011 2:48:49 PM	admin	$10.00	$16.80	Manual adjustment	user paid $10 at the front office
Jan 11, 2011 2:48:19 PM	[system] (print)	-$0.50	$6.80	Printer Usage	
Jan 11, 2011 2:48:14 PM	[system] (print)	-$0.50	$7.30	Printer Usage	
Jan 11, 2011 2:47:58 PM	[system] (print)	-$1.00	$7.80	Printer Usage	
Jan 11, 2011 2:47:13 PM	[system] (print)	-$1.00	$8.80	Printer Usage	
Jan 11, 2011 2:07:47 PM	[system] (print)	-$0.20	$9.80	Printer Usage	
Jan 11, 2011 1:13:24 PM	[setup wizard]	$10.00	$10.00	Initial allocation	

Figure 4.19. User account transaction log

4.8.3.3. Application Activity Logging

The Application Log records system events messages such as:

- User logins
- Security errors such as incorrect password attempts
- Backup times and scheduled tasks
- Any system errors or warning

It is similar to the operating system's event log. It is recommended that system administrators view this log on a daily basis for the first week and weekly thereafter.

Chapter 5. Services for Users

5.1. Introduction

How a user experiences and interacts with Print-Limit Pro will vary depending on how it is implemented. When configured as a silent monitoring solution, users may not even know Print-Limit Pro is in use. In other environments, users will make extensive use of the various services that are available.

Services are provided to users through one of two interfaces:

the *User Client*
: The User Client is an optional piece of software that provides additional functionality. The client software may be used to serve a number of purposes including to:

  - Display the user's account balance (for print charging or quota environments)
  - Display account selection or print conformation popups.
  - Show system messages such as "low balance" notifications.
  - Display popup warnings as configured by the administrator (e.g. Print policy discourage printing of emails).
  - Provide popup authentication services in anonymous desktop environments.

  The appearance of the user client tool may be customized to fit in with your organization. More information is available in Section 15.1, “Customizing the User Client Tool window”. The features visible to the user (e.g. popup dialogs) are a function of server-side settings and are configured by the administrator.

the *User Web Pages*
: The User Web Pages provide additional features that may be of use to users. Functionality includes summaries and logs of usage, using PrintCards, transferring funds and displaying usage costs. The User Web Pages are accessed either via the **Details...** link on the *User Client* window, or via the browser URL `http://[server_name]:9191/user` .

  The appearance of the user web pages may be customized to fit in with your organization's existing intranet, web pages or color scheme. More information is available in Section 15.3, “Customizing the User web pages”.

More information about each of these areas is available in the following sections.

5.2. User Client

The Print-Limit Pro activity tracking and charging is implemented using 100% server-side technology. User Client software is not required as part of the activity monitoring process.

> **Note**
>
> The use of client software for activity monitoring could open up security problems as client software is readily accessible to end-users. By design Netop developers endeavor to implement all monitoring at the server level eliminating client-side loopholes. The client software supplied with Print-Limit Pro is simply a presentation layer around server-side implementation.

Client software is provided to facilitate four tasks:

- Allow users to view their current account balance via a popup window.
- Provide users with a "last chance" before printing, confirming what they are about to print.
- Allow users to select shared accounts via a popup, if administrators have granted access to this feature.
- Display system messages such as the "low credit" warning message.

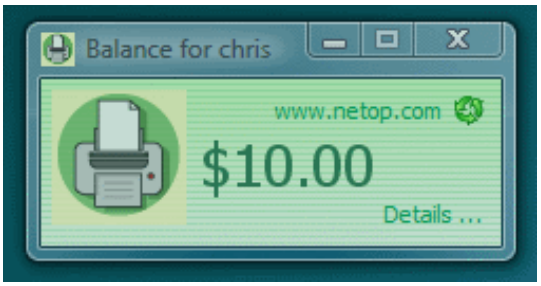


Figure 5.1. The user client balance window

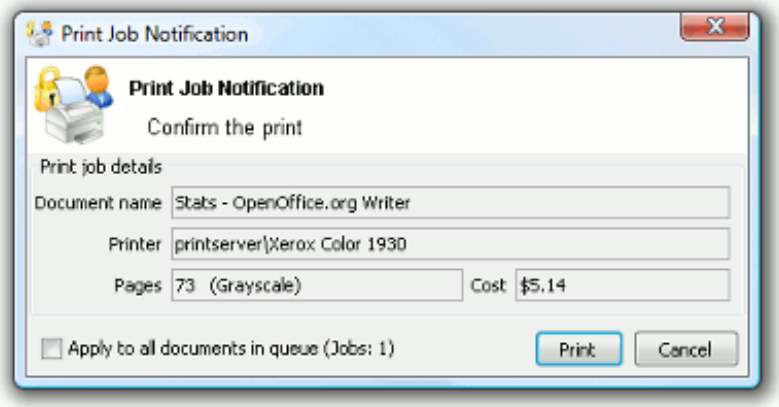


Figure 5.2. The user client's confirmation popup

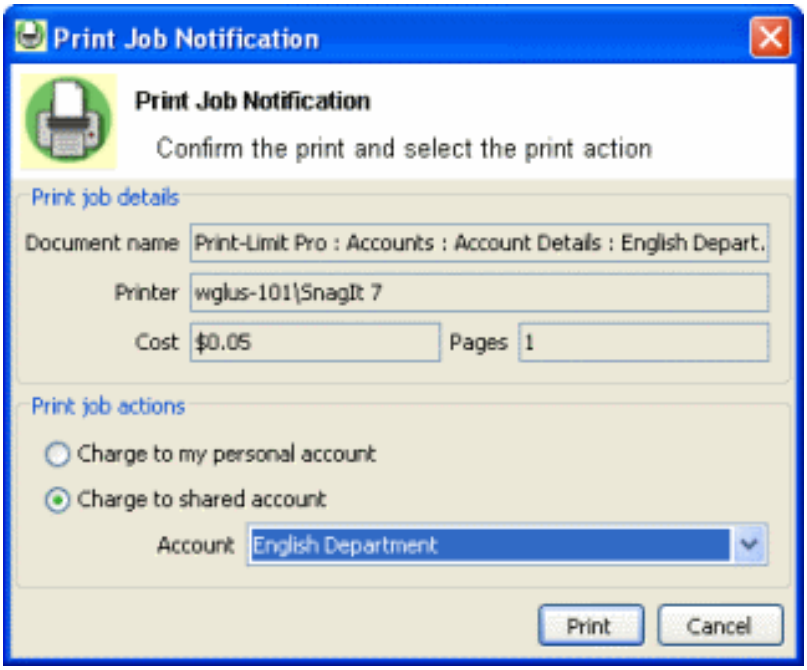


Figure 5.3. The user client's standard account selection popup

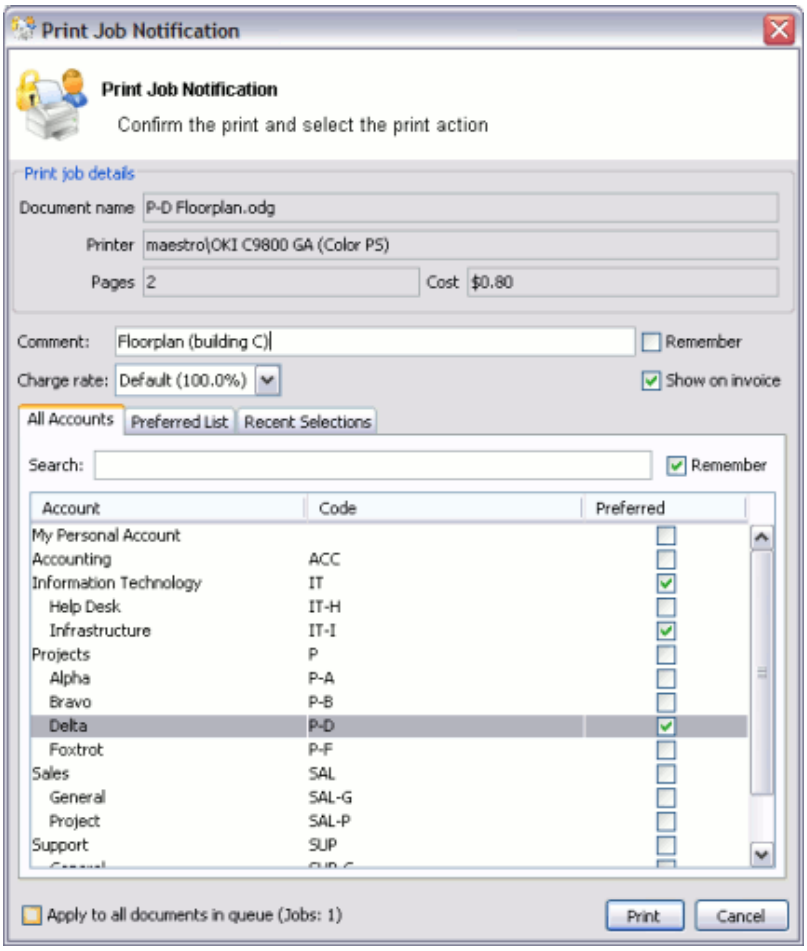


Figure 5.4. The user client's advanced account selection popup

The client software is available for most major platforms including:

- Microsoft Windows
- Macintosh OS X
- Linux and Unix

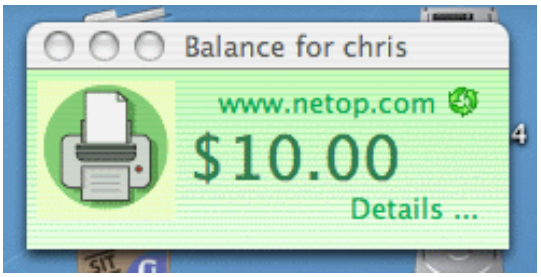


Figure 5.5. Print-Limit Client on Mac OS X

The client software and deployment tools are installed automatically on the server under the `[app-path]\client` directory. On a Windows based server this directory is automatically shared in read-only form providing network

users with access to the client executables.

The following chapters contain further information about the user client:

- Command line and config options are discussed in Section A.5, “User Client Options”.
- Customization of the user client is discussed in Section 15.1, “Customizing the User Client Tool window”.

Tip

The behavior of the user client, such as where on the screen it pops up or which option is selected by default, can be customized. This is discussed in Section A.5, “User Client Options”.

To educate the users about the user client, administrators might find the sample information sheets helpful.

5.2.1. User Client Deployment

5.2.1.1. Deployment on Windows

The Print-Limit Pro client software may be deployed to workstations using a variety of deployment methods. The deployment options are covered in detail in the `[app-path]\client\README.txt` file.

Options include:

1. If you're after a manual "setup wizard" style installer, run the program `client-local-install.exe` located in the network share `PCClient`. You can access this share by typing the following address into Windows Explorer. `\\<MyServer>\PCCClient\win`, where `MyServer` is the name of the server where Print-Limit Pro is installed.
2. Administrators looking for an automated install/deployment option should consider the "zero install" strategy. See below for details.

The recommended approach with Windows Domains is the "zero install" strategy. This involves configuring the workstations via group policy or otherwise, to run the client executable directly off the `PCClient` share - a share set up during installation. This avoids the need to undertake a separate installation process on each workstation and ensures the client software is automatically updated in conjunction with server updates.

The client can simply be run directly from the `PCClient` share setup on the server. Two executables provide this launch functionality:

```
pc-client.exe
pc-client-local-cache.exe
```

`pc-client.exe` will launch the client directly off the network share. The "local-cache" version (`pc-client-local-cache.exe`), is a smarter version that first copies itself and associated files to the local drive and launches itself from there. The local-cache version has the advantage that any future startups will use the local copy and hence minimize network traffic. The cache is self-managing and kept up-to-date ensuring that any new versions of the client are automatically and transparently copied down to the client.

Using `pc-client-local-cache.exe` is recommended on large networks. It does however require a globally writable cache directory. By default the cache is created in a directory on the system drive (normally `C:\Cache`). An alternate cache can be specified with the `--cache` command-line switch. Administrators should ensure than standard users have write access to the system drive, or manually create the cache directory if required.

The zero-install deployment option is not appropriate for all situations. A local install is recommend on Windows Laptop systems that are not permanently connected to the network or centrally managed by network administrators. The `client-local-install.exe` program can assist end users with a standard "setup wizard" install process. This installer may also be streamlined / automated by using command-line options, see Section A.7, “Automating /

Streamlining Installation on Windows" for more details.

For more information on alternate deployment options see the `[app-path]\client\README.txt` file.

5.2.1.2. Deployment on Mac OS X

This section covers the installation of the Print-Limit Pro client on Apple Macintosh systems. The complexities of Mac printing in general are discussed in Chapter 23, *Mac Printing in Detail*. Before installing the client software, we recommend that administrators study Chapter 23, *Mac Printing in Detail* and ensure printing is working as expected.

The Mac client is a supplied as a native Macintosh `.app` package. It's a universal application supporting Mac OS X 10.3.9 (fully patched) or higher on both PowerPC and Intel hardware.

Figure 5.6. Print-Limit Pro requires Mac OS X v 10.3.9 or later

The three common installation methods are outlined below cover most situations. The instructions for the "single user install" is very standard and should be able to be conducted by any Mac end-user. The other installation methods are more technically focused and aimed at Mac network administrators.

The client software will work best if Java 5 (or higher) is installed. Java 5 is available for OS X 10.4 or higher. If Java is not already installed, the installer is available from the Apple website. For Lion the download is available here: http://support.apple.com/kb/DL1421. The downloads for older operating systems are also available from Apple.

5.2.1.2.1. Single User Install

This method is suitable for a Mac computer used by a single user. For example, a personal Mac desktop or laptop. The installation process simply involves clicking on the `client-local-install` program. This copies the `PCClient` application into the over to the system's `Applications` folder and starts the client in the "confirm network identity" mode. The simplest way to run the install process is to connect to the server's `pcclient` share over the network, however alternate methods such as copying the folder contents via a USB key or drive are also possible.

To install the Mac client from the server's share:

1. Start and Log into the Mac computer. Ensure it's connected to the network.
2. Open the **Finder**.
3. From the **Go** menu, select **Connect to Server...**.

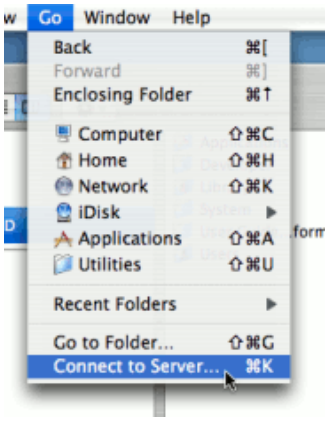


Figure 5.7. Connecting to a Windows server

4. Enter the pcclient share's connection details like: `smb://server_name/pcclient`

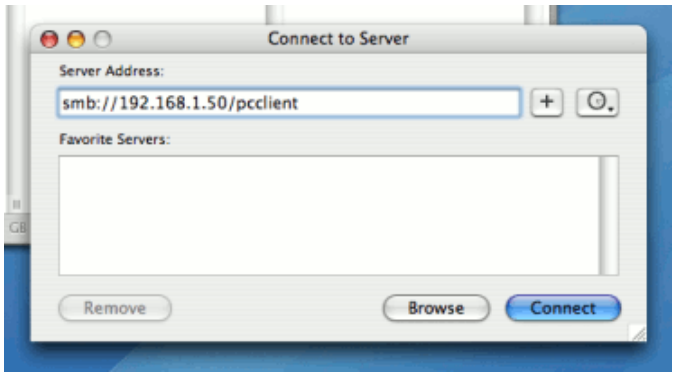


Figure 5.8. The PCClient share's connection string

5. Enter password information if requested.
6. Double-click the `client-local-install` file. This will execute a small AppleScript program that will commence the install/copy process.
7. Test the application by double-click on the `PCClient` application icon in the system's local `Applications` folder.

If the user needs the client for printing - for example to use the shared account popup - it's advisable to configure the application to automatically open upon start-up:

1. Open **System Preference...** from the **Apple** menu.
2. Select **Accounts**.
3. Select your login account.
4. Click the **Login Items** tab.
5. Click the + button and browse and locate the `PCClient` application.

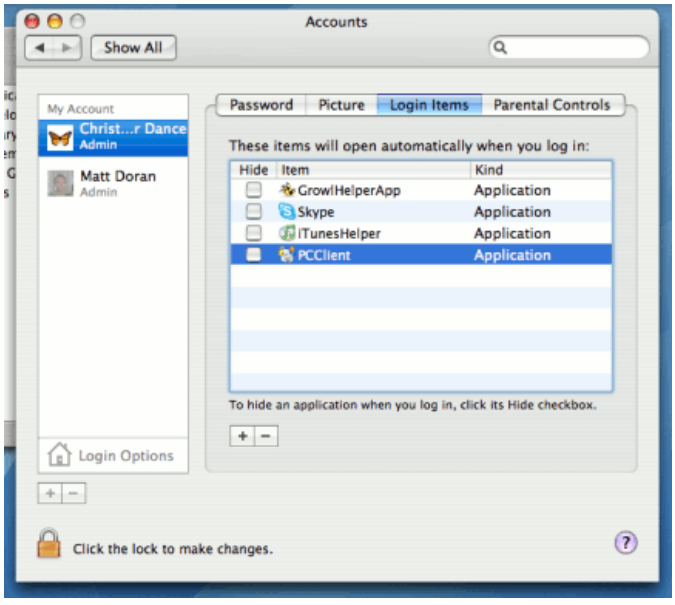


Figure 5.9. Add PCClient as a Login Item

6. Test by restarting the computer. The client should automatically after the reboot and login is complete.

5.2.1.2.2. Multi-User Install

On a multi-user Mac system, setting up a **Login Item** for each user would be a tedious task. To streamline this process, the `PCClient` application can be configured to start on login via the login hook. A login hook is an advanced Mac feature that works by running a script when a user logs in. The `PCClient` package includes a command script resource that installs the login hook.

To install the client on a multi-user system:

1. Start and Log into the Mac computer. Ensure it's connected to the network.
2. Open the **Finder**.
3. From the **Go** menu, select **Connect to Server...**
4. Enter the pcclient share's connection details like: `smb://server_name/pcclient`
5. Enter password information if requested.
6. Drag the `PCClient` package over to the local hard disk's **Applications** folder. The copy process will commence.
7. Control-click on the newly copied `PCClient` application in the **Applications** directory. Select **Open Package Contents**.

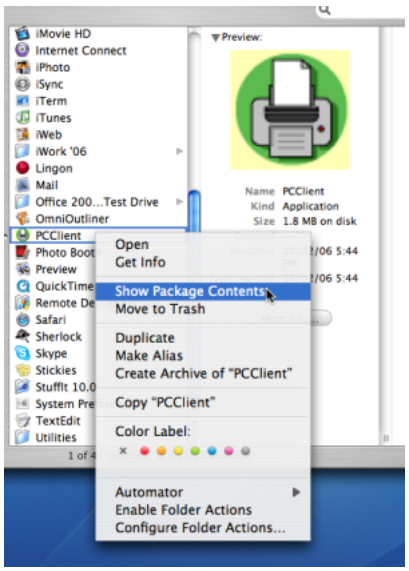


Figure 5.10. Control-click and open the package contents

8. Navigate to `Contents/Resources/`.
9. Double-click on the `install-login-hook.command` script.

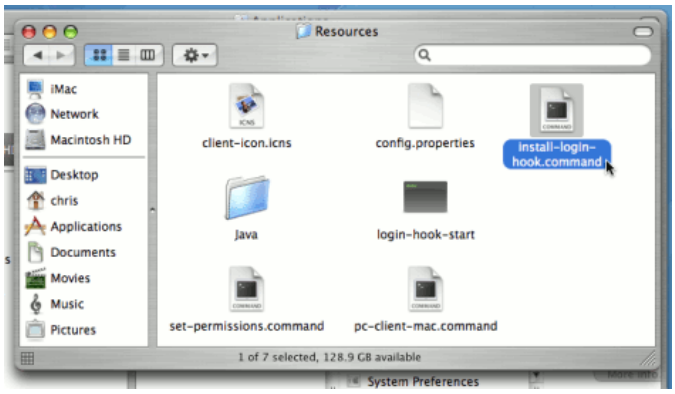


Figure 5.11. Double-click to install the login hook

10. Restart the system and verify the client starts on login.

Important

If you're already using a login hook for other script tasks, the setup process will be different. Instead in step 9, double-click on the `set-permissions.command` file. Then insert the following line at the end of your current login script (all on one line):

```
/Applications/PCClient.app/Contents/Resources/login-hook-start
    "$1"
```

The `set-permissions.command` script ensures the software is set up with the correct permissions, ensuring it's accessible to all users.

The login hook, once installed, can be removed with the terminal command:

```
sudo defaults delete com.apple.loginwindow LoginHook
```

5.2.1.2.3. Zero-Install Deployment

This deployment method is for advanced Mac network administrators and is suitable for medium to large Mac networks. Knowledge of the Mac's Unix underpinning and scripting is required.

A more flexible option over locally installing the `PCClient` package on each Mac system, is to directly launch the client from the `pcclient` share. The advantage of this deployment method is that any updates applied on the server (and hence updates to the client directory) will automatically be propagated to all workstations.

The process of setting up zero-install deployment will vary form network to network depending on the directory environment in use and administrator preferences. The process can however be summarized as:

1. Configure the Macs to mount the `pcclient` share as a volume on login or start-up.
2. Configure a login hook to start the client off the share. The `install-login-hook.command` resource script explained in the multi-user install above may help.

The typical way to mount the share is to use `mount_smbfs` in a boot script. See the Apple documentation on `mount_smbfs` at:

http://developer.apple.com/documentation/Darwin/Reference/ManPages/man8/mount_smbfs.8.html

Further information on Mac printing is available at Chapter 23, *Mac Printing in Detail*.

5.2.1.3. Deployment on Linux and Unix

The Print-Limit Pro user client software may be deployed on Linux and other Unix based operating systems using the following installation procedure.

5.2.1.3.1. Step 1 - Install Java 5.0+

Linux and Unix workstations are supported via Java. Java version 5.0 or higher is required. Your Linux distribution may come with Java pre-installed or have the option to install. If no Java option exists, Sun Microsystems provides a self-install Java distribution for Linux and other major Unix platforms.

Ensure Java 5.0 is installed and the `JAVAHOME` environment variable is defined on the `PATH`.

5.2.1.3.2. Step 2 - Copy (or Mount) the Print-Limit Pro user client files

Like the Windows version of the client software, the Linux/Unix Java version is installed in the `~/client` directory on the server. All files in this directory need to be copied, or make available to the Linux/Unix workstation. Common methods include:

- Copying the files from the server using file transfer programs such as FTP or scp.
- If the server is Windows based, connecting using smbclient or the Gnome or KDE `smb://` file browsing tools. The client files are shared via a read-only share called `\\[server_name]\PCClient`.
- If the server is Linux based, consider exporting the `~printlimit/client` directory via NFS and mounting on the workstations. The client can then be ran directly from the mount.

If the workstation is used by multiple users, the client directory should be copied to a common location such as `/usr/local/printlimit/client`.

5.2.1.3.3. Step 3 - File permissions

Open a command prompt and set execute permissions on the `pc-client-linux.sh` file as follows:

```
cd /usr/local/printlimit/client
chmod 755 ./pc-client-linux.sh
```

5.2.1.3.4. Step 4 - Testing

Log on as a user (a user listed in the Print-Limit Pro system) in your preferred Linux desktop GUI environment. Locate and execute the file `/usr/local/printlimit/client/pc-client-linux.sh`. The Print-Limit Pro client should open displaying the user's account balance.

It is usual to configure the client as a "Startup Program" or "AutoStart Program" launched during login. See your desktop documentation to see how to define a startup program.

A number of command-line options are available to change the client's behavior. More information can be found in Table A.2, “User Client command-line options”.

5.3. User Web Pages

The User Web Pages are accessed either via the **Details...** link on the *User Client* window, or via the browser URL `http://[server_name]:9191/user` .

The User Web Pages provide a range of services for users, including:

- *Summary*: A summary of usage and balance history.
- *Shared Accounts*: Lists the shared accounts that the user may use for printing.

- *Rates*: The current costs for printing and internet usage.
- *Use Card*: Add balance by using a PrintCard.
- *Transfers*: Transfer funds to other users.
- *Transaction History*: A history of balance transactions.
- *Recent Print Jobs*: A list of the user's recent printing.
- *Recent Internet Use*: A list of the user's recent internet usage.
- *Jobs Pending Release*: Print jobs pending release (when using a release station).

The services available provide a range of functionality that empowers users to make the most of Print-Limit Pro without requiring intervention from administrators. The user web pages allows users to do what they need for themselves, and quickly get back to what they were doing.

Many services can be switched on or off as required. This is useful for situations where a particular service is not suitable for exposing to the users. For example, some organizations may like to disable the ability for users to transfer funds.

Each service is discussed in the following sections.

5.3.1. Summary

This page provides a summary of the information most important for a user, including their current balance, a summary of their printing usage, and a graph of their balance history.

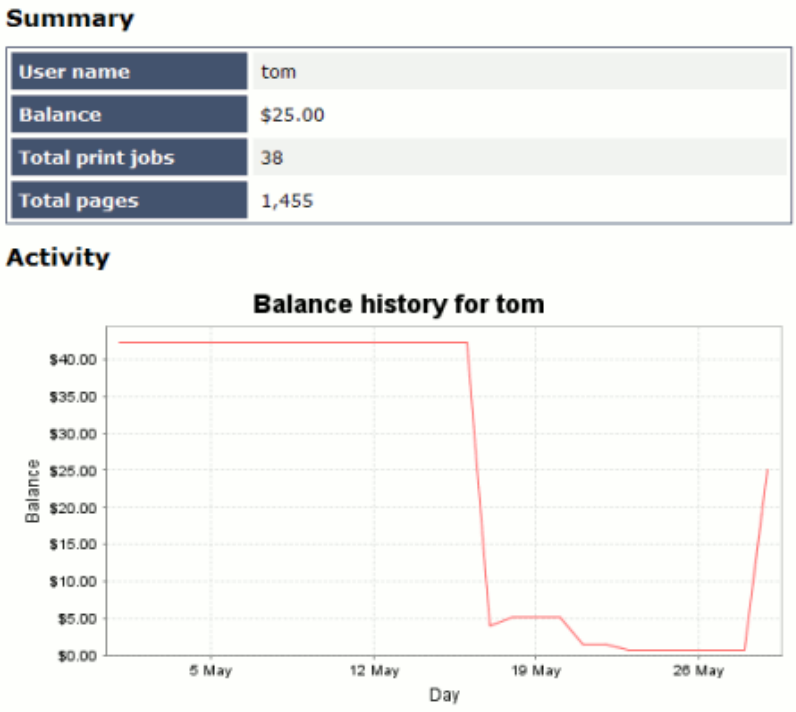


Figure 5.12. A user's summary information

5.3.2. Environmental Impact

One of the primary aims of Print-Limit Pro is to reduce printing levels by changing a user's printing behavior. Implementing monitoring, quotas and charging are a good way of drawing a user's attention to their habits. The topic of the environment, global warming, and waste management is currently an area of debate and interest to many.

Highlighting the environmental aspects of their activities is another good way of modifying a user's behavior.

The *Environmental Impact* section appears on the *Summary* page and provides the user with feedback on the environmental impact or footprint associated with their activities. Information presented includes an indication on how their printing equates to trees, CO_2 emissions and energy.

For more information about how these values are calculated, see Section 12.8, “Environmental Impact”. If desired, this option can be disabled via the **Options** section.

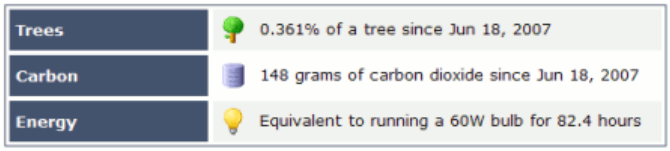

Trees
0.361% of a tree since Jun 18, 2007
Carbon
148 grams of carbon dioxide since Jun 18, 2007
Energy
Equivalent to running a 60W bulb for 82.4 hours

Figure 5.13. Draw a user's attention to their environmental impact

5.3.3. Shared Accounts

Shared accounts page lists the balances of the shared accounts that a user can access.

Account Name	Balance	Restricted
Arts Department	$80.50	No
commerce Department	$109.20	No
Economics Department	$9.80	No
English Department	$10.00	No
Finance Department	$10.00	Yes
History Department	$160.90	No
Information Technology Department	$10.00	No
Marketing Department	$50.80	No
Mathematics Department	$30.40	Yes
Science Department	$110.00	No

Figure 5.14. A list of available shared accounts

More information about shared accounts can be found in Chapter 8, *Shared Accounts*.

5.3.4. Rates

The rates page lets users know the printing costs associated with each printer. Displaying costs to users is a good way for them to see and understand the costs involved without having to spend time distributing the information to them.

Armed with this information, users can seek the most cost effective way to manage their printing. With discounts for grayscale and duplex printing clearly visible, ink and paper usage will be reduced by the users own accord.

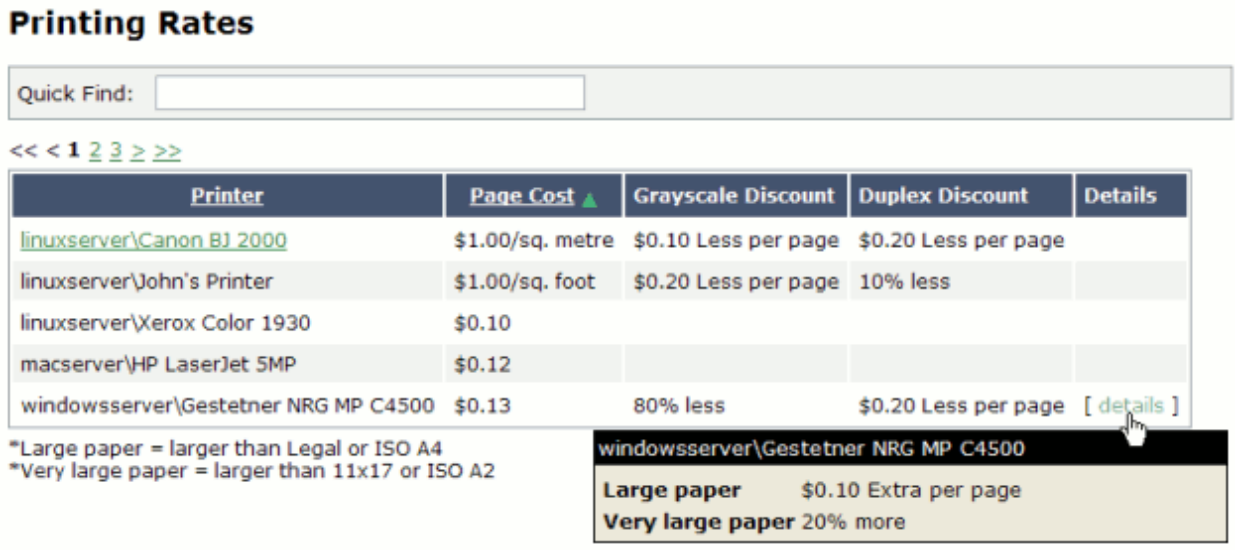


Figure 5.15. Printing costs as seen by the user

5.3.5. Use Card

From here users can use a PrintCard. When a valid card number is entered, the value of the card is transferred to the user's balance. More information about cards is available in Chapter 13, *PrintCards*.

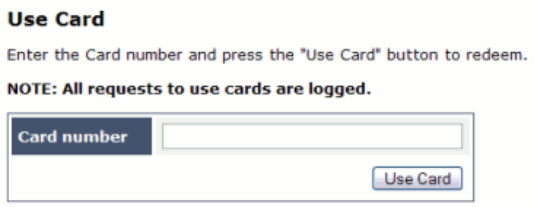

Use Card
Enter the Card number and press the "Use Card" button to redeem.
NOTE: All requests to use cards are logged.
Card number
Use Card

Figure 5.16. Using a PrintCard

5.3.6. Transfers

This page allows users to transfer credit to other users. Transferring balance can be useful in situations such as:

- A student transferring credit to a fellow student for printing something for them
- A teacher transferring credit to a student for extra printing
- Teachers trading printing credit between each other

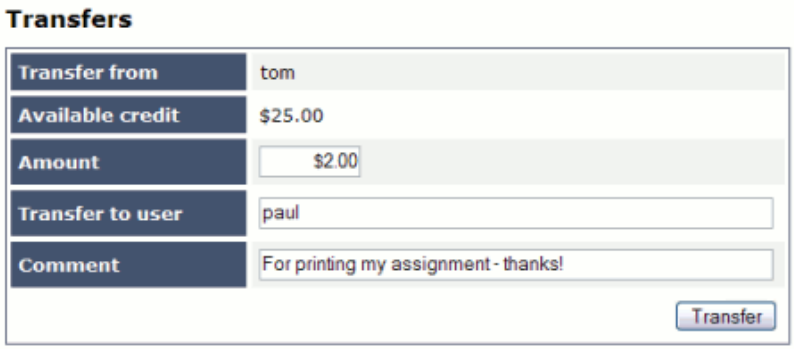


Figure 5.17. Transferring funds to another user

5.3.7. Transaction History

The transaction history page displays a user's balance history in detail. Here a user can see how, when any why their balance was affected. If there is ever doubt about why a user's balance is at the current amount, or what they have been spending their credit on, the transaction history page has the answer.

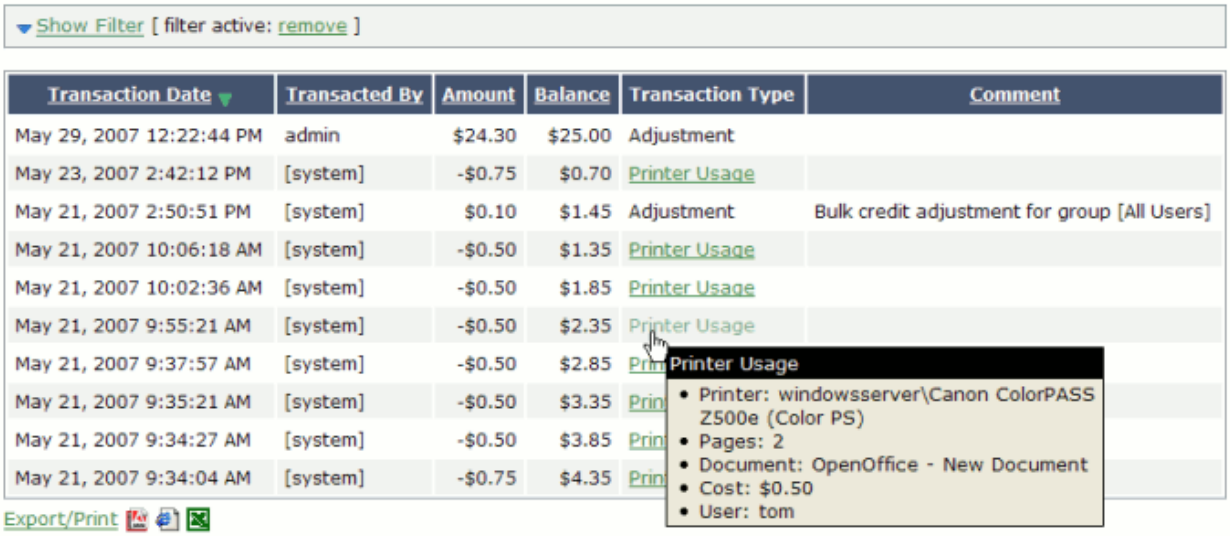

Show Filter [filter active: remove]
Transaction Date
Transacted By
Amount
Balance
Transaction Type
Comment
May 29, 2007 12:22:44 PM admin $24.30 $25.00 Adjustment
May 23, 2007 2:42:12 PM [system] -$0.75 $0.70 Printer Usage
May 21, 2007 2:50:51 PM [system] $0.10 $1.45 Adjustment Bulk credit adjustment for group [All Users]
May 21, 2007 10:06:18 AM [system] -$0.50 $1.35 Printer Usage
May 21, 2007 10:02:36 AM [system] -$0.50 $1.85 Printer Usage
May 21, 2007 9:55:21 AM [system] -$0.50 $2.35 Printer Usage
May 21, 2007 9:37:57 AM [system] -$0.50 $2.85
May 21, 2007 9:35:21 AM [system] -$0.50 $3.35
May 21, 2007 9:34:27 AM [system] -$0.50 $3.85
May 21, 2007 9:34:04 AM [system] -$0.75 $4.35
Printer Usage
Printer: windowsserver\Canon ColorPASS Z500e (Color PS)
Pages: 2
Document: OpenOffice - New Document
Cost: $0.50
User: tom
Export/Print

Figure 5.18. A user's recent balance transactions

5.3.8. Recent Print Jobs

This page displays the user's printing history. It allows a user to see the cost of their print jobs, or to find a particular print job. The filter criteria allows for many different views of printing, and can be used to easily drill-down to find the information required.

Figure 5.19. A user's recent printing

5.3.9. Jobs Pending Release

This page allows users to view and interact with jobs held in a hold/release queue. From here, jobs that have been held in a managed queue can be released (printed) by the user. This allows for them to confirm the cost and details of the job before printing, and/or confirm their identity before the job is released.

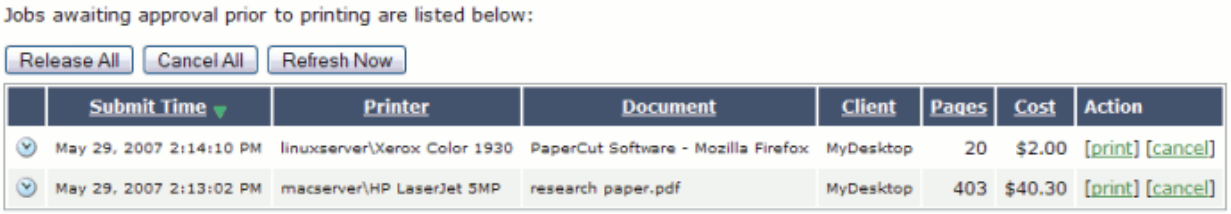


Figure 5.20. The user's view of jobs pending release

More information about hold/release queues is covered in Chapter 10, *Hold/Release Queues & Print Release Stations*.

5.3.10. Web Print

Web Print is a printing solution ideal for laptops and other non-domain connected systems. This page allows users to upload documents for printing, rather than requiring the print queues to be installed on their system.

The user will be guided through a wizard where they can select a printer, choose options such as number of copies, and select a document to upload. The document will then be queued for printing and the user can track its status from this page.

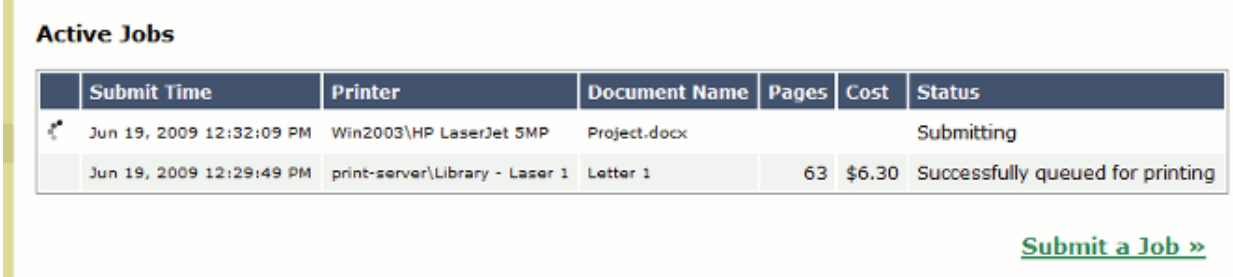


Figure 5.21. Web Print jobs in progress

More information about Web Print can be found in Chapter 19, *Web Print (Driver-less printing via a web browser)*.

5.4. Mobile User Web Pages

When the user web pages are accessed from a mobile browser (e.g. Mobile Safari from an iPhone) the user will be presented with a lightweight interface that has been optimized for smaller screen sizes.

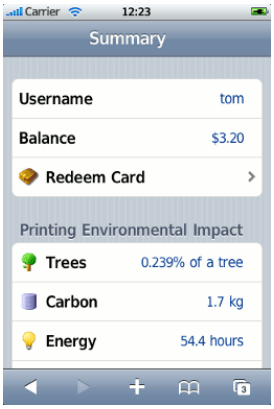


Figure 5.22. Mobile user web tools - summary page

The user may choose to view the user web pages in desktop mode instead by clicking **View in Desktop mode**.

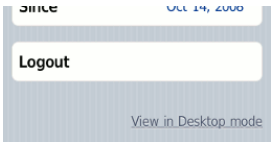


Figure 5.23. View in Desktop mode link

Features available in the mobile user web pages include:

- Checking user balance

Figure 5.24. Mobile user web tools - balance

- Viewing environmental impact statistics

Figure 5.25. Mobile user web tools - environmental impact statistics

- Redeeming a PrintCard

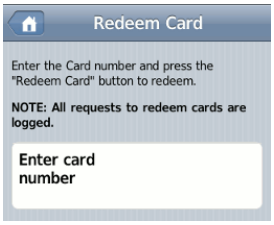

Redeem Card
Enter the Card number and press the "Redeem Card" button to redeem.
NOTE: All requests to redeem cards are logged.
Enter card number

Figure 5.26. Mobile user web tools - redeem PrintCard

Figure 5.27. Mobile user web tools - entering a PrintCard number

For more information about the full (desktop) user web pages see Section 5.3, “User Web Pages”.

5.5. Gadgets/Widgets and more...

Gadgets/Widgets are a lightweight application that sits on a user's desktop. Windows Vista has in-built support for sidebar gadgets. The equivalent on the Mac is the Widget. Print-Limit Pro offers three useful Gadgets as well as a series of AJAX/JSON style embeddable components that can be leveraged by intranet developers.

5.5.1. Windows Vista Gadgets

Two small footprint Windows Vista Gadgets are available:

- *The Print Balance Gadget:* Used to display user's personal balance on the desktop or sidebar. This is called

`PCBalance.gadget`.

- *The Environmental Impact Gadget:* Used to provide the users with feedback on the environmental impact associated with their printing activities. Highlighting the environmental aspects is useful in modifying a user's behavior towards printing. For more information about how these values are calculated, see the section called Section 12.8, “Environmental Impact”. This gadget is called `PCEnvironmentalImpact.gadget`.

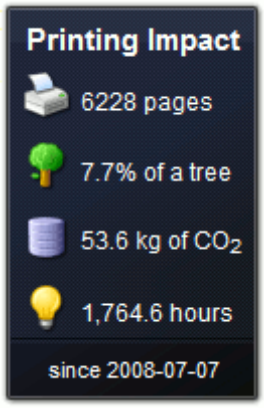


Figure 5.28. The Environmental Impact Gadget

Figure 5.29. The Print Balance Gadget

To install a Gadget:

1. Log in as administrator
2. Browse to the share on the Print-Limit Pro server at `\\server\PCClient\win\Gadgets`
3. Copy all `*.gadget` folders to the local directory `C:\Program Files\Windows Sidebar\Gadgets`
4. Users should now see the Print-Limit Pro Gadgets as available Gadgets on the system.

5.5.2. Web Widgets

Print-Limit Pro also provides web widgets that can be easily embedded within pages on your intranet site. These widgets work in a similarly to Google Web Gadgets or the Google Maps APIs. All that is required is to paste a few lines of HTML/JavaScript on your pages. There are two built-in web widgets that offer balance and environmental impact (and look identical to the Vista widgets above). However if the built-in widgets do not suit your needs you can create your own that better suit your site.

There are only two requirements to running web widgets on your intranet site:

1. You require edit access to the intranet pages to add the required HTML/JavaScript.
2. The username of the logged in user is required so the web widget knows whose details to load. This will usually require that users login to the intranet. When using a Microsoft Active Directory domain and Microsoft IIS web server the user is automatically logged in and their username is available.

The simplest way to get started with web widgets is to look at some examples. There are detailed and well commented examples available on the Print-Limit Pro server in the directory

`[app-path]/server/examples/webwidgets/examples.html`. These examples should be used as a starting point to implement web widgets on your site.

The basic steps to adding a web widget to a page are:

1. Add a `<div>` element to your page. The widget will be drawn within this tag. The div element must be given a unique `ID`.
2. Include scripts into your page to load the widget and user data from the Print-Limit Pro.
3. Edit the included script to set `pcUsername` to the logged in user.
4. Edit the included script to set `pcServerURL` to base URL of the Print-Limit Pro server.
5. Add some script to draw the built-in widgets to the page. You can use one of the built-in widgets, or create your own.

Chapter 6. Advanced User Management

This section covers some of the more advanced user management tasks. On large networks managing users on an individual basis is not practical. Management needs to be handled either via a level of automation, or manually at group level. Some common user management tasks that typically consume time on a large network include:

- Allocating user credit or quotas.
- Creating new user accounts
- Performing administration tasks such as allocating additional allowances or applying different privileges.

Print-Limit Pro offers a number of features to help automate these tasks.

6.1. Groups in Print-Limit Pro

Groups are collections of users. Print-Limit Pro uses the network domain or computer's groups, meaning administrators can take advantage of the existing network structure. Groups in Print-Limit are used in the following ways:

1. To control how quota/credit is allocated to users on a regular basis.
2. To automate the addition of new (future) user accounts.
3. To assist with making modifications to user accounts by group.
4. For group based reporting.

Print-Limit Pro mirrors (caches) domain network group memberships for performance reasons. Hence changes in group membership made at the domain level may not be immediately reflected in Print-Limit. The group membership can be refreshed at any time via the **User/Group Sync** option under the **Options** section. Groups are mirror/cached for two reasons:

- For fast reporting and search performance.
- To ensure Print-Limit Pro is a good network application and does not overload domain controllers with group membership requests.

Many large networks may contain hundred of groups and/or organizational units. In many cases only a small percentage of these groups are pertinent to Print-Limit Pro management. To ensure administrators are not overwhelmed with all groups, Print-Limit Pro only lists the groups selected as relevant by the administrator.

To add a group to Print-Limit Pro:

- Navigate to the **Group** section.
- Select the **Add/Remove Group** link at the bottom of the groups list.
- Select the group(s) required on the left-hand-side and click the **Add** arrow.
- Click the **OK** button to add the group(s).

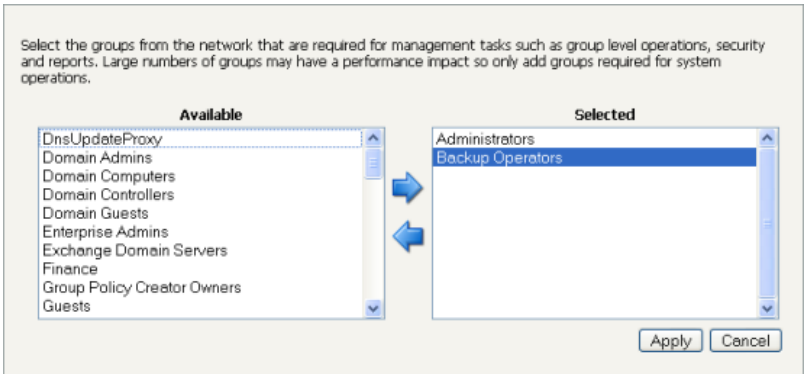


Figure 6.1. Adding/removing groups

Print-Limit Pro includes one built-in group called the `[all users]` group. This group is not related to any existing network group and simply is a "catch all" group that represents *all users* list in the Print-Limit system. It is similar to the "Everyone" special group in Windows.

Note

Print-Limit Pro sources groups and group members from your selected directory/domain source. There are however some situations where maintaining groups within the network directory source is not possible. For example, may you only have read-access to the domain. If for technical reasons it's not possible to define the required groups in your network directory, groups may also be defined via a text file (e.g. a tab-delimited file). Simply place your group definition file at the location `[app-path]/server/data/conf/additional-groups.txt`. See the template file `additional-groups.txt.tmpl` in the same directory for an example and further information.

6.2. Setting up quota allocations

In many organizations Print-Limit Pro is used to control and restrict users to sensible use by allocating a quota or allowance (a budget). For example a user may be allocated $10.00 a week. This type of control is particularly popular in schools and universities. The process of quota allocation can be automated via the **Groups** section.

To allocate a $10.00 a week to members of the Students group:

1. Navigate to the **Groups** section
2. Add the `Student` group via **Add/Remove Groups** if not already listed.
3. Select the Student group
4. Under the **Quota Scheduling** section, select a period of Weekly and enter `10.00` in the **Schedule amount**.
5. Click the **Apply** button to save the change.

Group Details: Support
Details
The group or organization unit's name.
Group Name
Support
Quota Scheduling
Quota can be added to users' accounts on a scheduled basis either daily, weekly or monthly.
If 'Only allow accumulation up to' is not selected, the user's balance will accumulate indefinately.
If 'Only allow accumulation up to' is selected, the user's balance will only accumulate to the amount specified.
Period
Weekly
Schedule Amount
$0.00
Only allow accumulation up to:
$10.00

Figure 6.2. The Group Details screen

To configure quotas correctly it is important to understand how quota allocations work. Users receive quotas for all groups they belong to. For example, consider the situations where `Students` and `Student Newspaper` groups are defined in Print-Limit Pro, with $20/month and $10/month quotas respectively. If a student belongs to both groups they will receive a $30/month of quota. If they belong to only the `Students` group they will receive only $20/month.

If you configure a quota on the special `[All Users]` group then all users in the system will receive this quota in addition to quotas defined on other groups.

Credit will be assigned to group members at just past 12:00am (midnight) on the day of the schedule. Administrators can verify that this has taken place by inspecting log entries in the Application event log and/or users' transaction logs.

Task	Time
Daily Allocations	Applied at `12:10am` every day (7 days a week).
Weekly Allocations	Applied at `12:20am` on Sunday.
Monthly Allocations	Applied at `12:30am` on the first day of the month.
Custom Allocations	Applied at `12:10am` on the given day (after the daily allocations).

Table 6.1. Quota schedule times

One potential issue associated with quota allocation in some organizations (for example Schools or Universities) is that users can "bank up" their quota allowance over time leading to excessive use at periods of the year such as the end of semester. The **Only allow accumulation up to** option can be used to implement a "use it or lose it" policy!

6.2.1. Custom Quota Scheduling Periods

In some cases quotas may need to be scheduled for unusual times. A good example of this is unusual term or semester start dates. The `Custom` quota scheduling period allows specifying any date for which to run quotas. To set a custom quota scheduling period:

- Select the group for which to allocate quotas
- Under the **Quota Scheduling** section, select a **Period** of **Custom**.

- Enter a date in the ISO international date format `YYYY-MM-DD` (e.g. `2007-03-15`). Multiple dates may be entered, separated by a comma (e.g. `2007-03-15,2007-08-20`). * wildcards are supported.
- Click the **Apply** button to save the change.

Tip

The year may be omitted or replaced with a * wildcard to specify that quota allocations should take place on the same date every year. The same is true for months.

For example, entering `*-03-15` or `03-15` will result in quotas being allocated on March 15th every year.

Entering `*-*-15` will result in quotas being allocated the 15th of every month of every year.

6.2.2. Advanced User Quota Management

Some organizations may require scheduling quota allocations for periods other than those available above. For example, an education organization may like to schedule quota allocation per term, semester (period) or academic year, which may not have set dates. This can be achieved by a manual update when necessary though **Bulk user actions ...** in the **Users** or **Groups** tab. More information is available in Section 6.4, “Bulk User Operations”.

It is also possible to automate the allocation of user quota through the use of Server Commands (see Section A.1, “Server Commands (server-command)”) or XML Web Services (see Section A.3, “The XML Web Services API”).

6.2.3. Automated Quota Allocation Example

One way to automate quota allocation is through the use of Server Commands. Following is an example of how to use Server Commands to automate quota allocation in a Microsoft Windows environment:

North Shore High would like to automate their quota allocation on a per-term basis. There are four terms in a year, and terms do not necessarily start on the same date every year. Junior students are to receive $5 per term printing budget, and senior students are to receive $10 per term. The domain has the groups `junior-students` and `senior-students` to reflect the students' grade.

Using the information from Section A.1, “Server Commands (server-command)”, we can see that the Server Command `adjust-user-account-balance-by-group` will meet the needs of this situation. Create a batch file with a name like `assign-term-quotas.bat` with content similar to the following (depending on your environment):

```
cd "C:\Program Files\Print-Limit Pro\server\bin\win"
server-command adjust-user-account-balance-by-group "junior-students" \
    +5.00 "$5 term budget for junior students"
server-command adjust-user-account-balance-by-group "senior-students" \
    +10.00 "$10 term budget for senior students"
```

Note: backslash indicates text should appear on the same line.

Running this script will allocate $5 to all members of the group `junior-students`, and $10 to all members of the group `senior-students`. The script can then be scheduled to run at the specified dates by the use of a tool such as Windows Task Scheduler (**Control Panel** → **Scheduled Tasks** → **Add Scheduled Task**).

This example can be found with your Print-Limit Pro installation under `[app-path]\server\examples\scripting\batch\assign-term-quotas.bat`.

6.3. New User Creation Rules

It is inevitable that new users will be added to your network in the future. To streamline account setup, Print-Limit

Pro offers the option of having new users automatically assigned initial settings such as starting credit, privilege level, and other settings based on their group membership. Users are automatically added to Print-Limit Pro when either:

- The user sends his or her first print job
- Overnight during user/group synchronization
- When a manual user/group synchronization is performed
- When a user logs in (i.e. authenticates) to the user client, release station or user web pages

Taking the time to configure initial settings rules means one less job for administrators to perform! The group based control offers maximum flexibility and ensures that it's possible to have a different set of initial settings rules for different types of users. This flexibility is particularly important in an academic environment where students of different year levels need different settings.

For example an administrator may wish for new users belonging members of the `Senior Students` group to be allocated $10 starting credit and `restricted` access, while all other students receive $5.00 starting credit.

New user creation rules are controlled under the **Groups** → **Group Details** → **New User Settings** section. When a new group is added it does not provide any new user settings. To enable user creation rules for a group the **Use this group to define new user settings** option must be enabled.

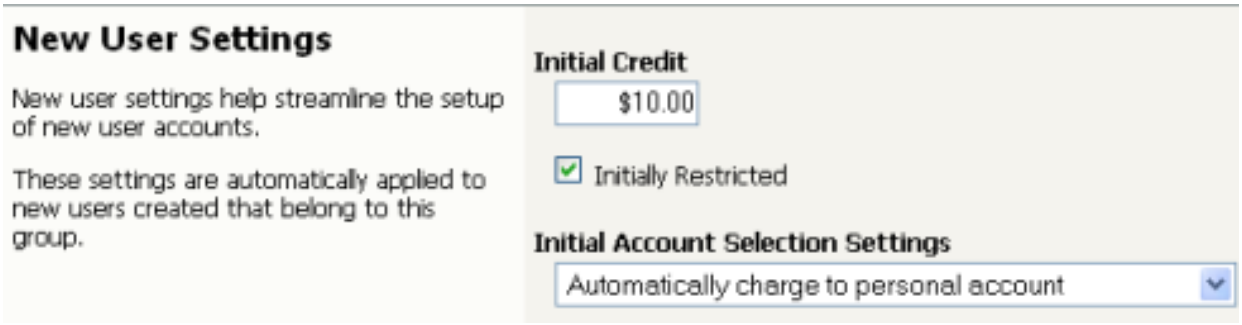

New User Settings
New user settings help streamline the setup of new user accounts.
These settings are automatically applied to new users created that belong to this group.
Initial Credit
$10.00
Initially Restricted
Initial Account Selection Settings
Automatically charge to personal account

Figure 6.3. Initial settings applied to new users

Important

Changes made to `new user` settings are in the **Groups** section only affect users *NOT* yet listed in the system. (i.e. future users). Any users *already* listed in the system are not affected. Initial user settings also do not apply when users change groups. To modify settings or credit on existing users, see **Bulk user actions** in the following section.

Tip

Initial settings can become confusing when a user belongs to more than one group. Print-Limit Pro uses the following logic to allocate initial settings:

- The user obtains a starting credit that is the sum of all the matching groups (the special `[all-users]` group is ignored).
- If any of the matching groups has `unrestricted` access, the user will inherit unrestricted status.
- If any of the matching groups has account selection popup settings, the user will inherited the ON settings.
- If the user does NOT belong to any group with new user settings defined, they will inherit the

settings applied to the special `[all-users]` group.

- The initial settings are applied from each group in alphabetical order. So for settings that cannot be merged (e.g. charge to single shared account) the last group alphabetically will take precedence.

Tip

To control when users are automatically created, see Section 12.3.7, “On Demand User Creation”.

6.4. Bulk User Operations

A bulk user operation refers to an operation that is applied to more than one user. This operation was referred to in previous Print-Limit releases as "Group level functions". Bulk operations can be performed on a user group or a comma separated list of users. Bulk user operations are best described by example.

6.4.1. Example 1: Bulk operation on a user group

John is a network administrator at a local high school. A number of students from each year level have been placed on the school newspaper committee. The head teacher has requested that John allocated an extra $10.00 of printing credit to these students. The students are all in a network group called "NewspaperCommittee". John performs this operation as follows:

1. Clicking the **Bulk user actions** link under the **Users** section.
2. Selecting NewspaperCommittee as the group to perform the action on.
3. Selecting the **Adjust credit by** option and entered $10.00 in the amount field.
4. Entering a transaction comment of "extra allowance for newspaper committee role".
5. Clicking the **OK** button to apply the change.

6.4.2. Example 2: Bulk operation on an ad-hoc list of users

Now, John wants to add $10.00 credit to a list of users he has saved in a Excel spread sheet. John will need to perform this operation as follows:

1. Clicking the **Bulk user actions** link under the **Users** section.
2. Change the **Perform operation on users** to **in the list**.
3. Cut and paste the list of names from the spread sheet. This would generate a comma separated list of usernames.
4. Selecting the **Adjust credit by** option and entered $10.00 in the amount field.
5. Clicking the **OK** button to apply the change.

6.4.3. Additional information

Bulk user operations apply changes to all users matching the selected group and other criteria. Settings under the **Groups** section or shared accounts are not affected.

Warning

Group level operations are one-way and cannot be undone. Always carefully consider the operation before proceeding. If you are unsure of the function or behavior, performing a backup prior to undertaking the operation is advised.

Other bulk user operations available under **Bulk user actions** include:

- Adjust or set the users' credit (perform a transaction).
- Change the users' restriction status
- Modify account selection popup options
- Reset the users' count statistics
- Apply user level overrides like print cost adjustments, and disabling printer filters for a user
- Disable printing for a specified period of time

6.5. Using Overdrafts

The overdraft setting applies to restricted users (and restricted Shared Accounts). An overdraft allows a user to continue to use services even though their account has dropped below zero. In essence, the overdraft value moves the "zero-point" allowing users to overdraw the account to the agreed limit. An overdraft can also be referred to as a credit limit.

Reasons for using an overdraft include:

- Provide users with flexibility between budget, quote or allocation periods. For example, an overdraft will allow a user to "draw on" a portion the next month's quota allocation.
- To Implement a credit system with credit limits rather than an up-front pay system.
- Grant trusted users a "loan" on a case-by-case basis.

An overdraft can be defined at two levels:

1. Globally as a default affecting all users and shared accounts.
2. On an individual user or account basis.

The default overdraft is zero. This can be changed by **Options** → **General** → **Account Options** → **Default overdraft limit**

Optionally, a separate overdraft can be applied to an individual user (or shared account) using the following procedure:

1. Click on the **Users** section.
2. Select the user.
3. Ensure the account is set as **Restricted**.
4. In the **Overdraft** field, select the option **Individual overdraft**.
5. Enter a positive value in the adjacent overdraft balance field.
6. Click **Apply** to save the changes.

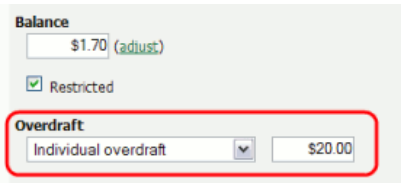


Figure 6.4. Setting a user's overdraft to $20.00

6.6. Batch User Data Import and Update

The user data batch import and update feature allows the administrator to import users, user information and optionally update existing users details by reading data from a simple text file. It enables administrators to update the following user data:

- Credit balance
- Restriction status
- Full name
- Email address
- Department
- Office
- Card/ID Number
- Card/ID PIN
- Notes

Examples of where the batch user details import feature is useful include:

- To set the user email addresses that are stored in another system (like a student management system).
- When importing user and balance data from another external or legacy system.
- When moving user balances from previous Print-Limit editions to Print-Limit Pro.

For more information on using the batch import to import data from previous Print-Limit editions, please see Appendix F, *Upgrading from Print-Limit Standard*.

Tip

Print-Limit Pro is designed to import user information from the underlying system or network domain. The batch user data import feature is not designed to replace this but rather complement it by allowing importing of user data from other systems our sources. For information about managing a set of users in addition to those in a user directory see Section 25.1, “Internal Users (users managed by Print-Limit Pro)”.

To perform a batch import:

1. Manually inspect your file in a text editor and ensure it's in the prescribed tab-delimited format as detailed at Section 6.6.1, “Batch User Import File Format”.
2. Navigate to the **Users** section.
3. Click the **Batch import ...** action (on the left).
4. Click **Browse** to select the file to import. (The format of the file is described in Section 6.6.1, “Batch User Import File Format”).
5. Choose whether you want the import to create new users if they do not already exist. If you clear this checkbox, lines that contain users that do not exist will be ignored and only existing users will be updated.
6. Press the **Import** button.
7. Upon completion you will be told how many users were updated and how many users were created.

Caution

Batch imports are a major operation modifying data en masse. Best practise suggests:

- Always run a backup *before* proceeding with the import.
- First experiment/test the import process with a small batch of users before moving onto the full batch.

6.6.1. Batch User Import File Format

The import file is in tab delimited format and contains the following fields in the given order.

No.	Field	Description	Optional?
1.	Username	The user's username	Mandatory
2.	Credit Balance	The user's credit balance	Optional - balance not set if blank
3.	Restricted Status	The user's restricted status. (Y/N)	Optional - restricted status not set if blank
4.	Full Name	The user's full name	Optional - full name not set if blank
5.	Email	The user's email address	Optional - email not set if blank
6.	Department	The user's department or faculty	Optional - department not set if blank
7.	Office	The user's office or location	Optional - office not set if blank
8.	Card/ID Number	The user's identity/card number	Optional - card/id number not set if blank
9.	Card/ID PIN	The user's card PIN number	Optional - card/id PIN not set if blank. If the field is '-' then the PIN is set to zero.
10.	Notes	Notes about the user.	Optional - notes not set if blank

Table 6.2. User Import File Format

Other limitations: Although any actual limit to the size of an import file should be large enough for any purpose, we recommend keeping the file size below 10MB.

Tip

A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, and then save it in the `Text (Tab delimited)` format.

6.6.1.1. Import File Format Examples

The following lines shows importing all the above fields. (The fields are separated by tabs).

```
matt 20.00 Y Matt Johnson mattj@email.com Science Dept Head office \
    103251 912254 NoteA
john 25.00 N John Jackson jj@domain.com Administration Other office \
    963254 123254 NoteB
```

Note: backslash indicates text should appear on the same line.

The following lines shows importing user email addresses only. NOTE: That the tabs still exist for balance, restriction, full name fields, but each entry is blank.

```
matt                            mattj@email.com
john                            jj@domain.com
```

The following lines shows importing the credit balance and full name for the first user and the credit balance and email address for the second user. NOTE: That the tabs characters still exist for blank fields.

```
matt 10.00          Matt Johnson
john 15.00                  jj@domain.com
```

6.7. Batch User Card/Identity Update

In Print-Limit Pro a unique card/identity number can be associated with each user. This number may represent student or employee numbers and can assist in searching for a particular user using the quick find. (Do not confuse this number with the PrintCards.) The number may also be used as an alternative to usernames/passwords for authentication at software release stations, or at hardware terminals attached to photocopiers.

The batch user card/ID update feature allows the administrator to update user card/ID numbers and optionally import or update PINs by reading data from a simple text file. User card/ID numbers may also be imported using the batch user import/update feature (see Section 6.6, “Batch User Data Import and Update”) or from a directory server such as Active Directory or LDAP (see Section 12.3.6, “Importing Card/Identity numbers from Active Directory or LDAP”).

Example: To update/import the card/ID numbers or PINs of all the users in the import.txt file on a windows system.

```
C:\> cd C:\Program Files\Print-Limit Pro\server\bin\win
server-command batch-import-user-card-id-numbers "C:\card numbers\import.txt"
```

Note that the import path should be quoted if it contains spaces.

Important

The card/ID number must uniquely identify a user, so care should be taken to ensure that no two users have the same card/ID number. This means that the card/ID numbers defined in the import file should be unique. If Print-Limit Pro encounters a non-unique card/ID number that user will not be updated.

A batch user card/ID update may be performed by calling the `batch-import-user-card-id-numbers` server-command. Use of server-command is detailed in Section A.1, “Server Commands (server-command)”. The import file format is detailed in Section 6.7.1, “Batch User Card/Identity Update File Format”.

Caution

Batch updates are a major operation modifying data en masse. Best practise suggests:

- Always run a backup *before* proceeding with the import.
- First experiment/test the update process with a small batch of users before moving onto the full batch.

6.7.1. Batch User Card/Identity Update File Format

The import file is in tab delimited format and contains the following fields in the given order.

No.	Field	Description	Optional?
1.	Username	The user's username.	Mandatory
2.	User Card/ID Number	A unique card/ID number for this user.	Optional (card/ID number not set if blank)
3.	User Card/ID PIN	The user's card/ID PIN.	Optional (card/ID PIN not set if blank)

Table 6.3. User Card/Identity Update File Format

Other limitations: Although any actual limit to the size of an update file should be large enough for any purpose, we recommend keeping the file size below 10MB.

If your card/ID numbers are stored in an external database, see Section 6.8, “Looking up card numbers in an external database”.

Tip

A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, then save it in the `Text (Tab delimited)` format.

6.8. Looking up card numbers in an external database

Print-Limit Pro can import user card/identity numbers from Active Directory and LDAP. This is the recommended approach because it allows the card/ID numbers to be associated with users in a centralized location. For more information see Section 12.3.6, “Importing Card/Identity numbers from Active Directory or LDAP”.

Card numbers can also be imported using the import file described in Section 6.7, “Batch User Card/Identity Update”.

In some circumstances the mapping between card numbers and users may be stored in another external database (e.g. a database used for secure door access). In this case, it may be more convenient to look up the card numbers in this database in real-time.

Tip

This also allows users to be associated with multiple card/ID numbers. This is useful where users are allocated different types of authentication cards, or there are alternate card systems used throughout the organization.

To allocate multiple card numbers to a user, simply populate the mapping table with multiple entries per user where different card numbers map to the same username.

Once external user lookups are enabled, Print-Limit Pro will do the following when looking up a user by card number:

1. Find a user with the matching card number in the Print-Limit Pro database.
2. If not found, the card number will be looked up in the external database.
3. If a match is found the information returned is used to find the matching user in the Print-Limit Pro database. If a user is found the lookup is successful.

6.8.1. Database lookup configuration

To enable external card number lookups:

1. Navigate to **Options** → **Advanced** → **External User Lookup**.
2. Enable the option **Use external database for card number lookup**.
3. Select the database type. If using Oracle or MySQL you must install the database driver as described in the Section 18.3, “Database specific configuration”, and the application server must be restarted.
4. Enter the database connection URL. For examples see Section 18.2.4, “Step 4 - Change the Print-Limit Pro connection details” of Section 18.2, “Upsizing to an External RDBMS”.
5. Enter the database connection username and password.
6. The option **SQL to map card number in external database to:** allows you to choose what the card number in your external database maps to. The options include:
   - **username**, used if your external database contains a mapping between card numbers and usernames, and
   - **user's identity number**, used if your external database contains a mapping between card numbers and user ids (and the user ids have been imported and stored on users in Print-Limit).

   Select the option that matches the mapping in your external database.
7. Enter an SQL select query that looks up the card number in your external database and returns either a username or user id as selected above. The query must return a single row with the first field being the username or user id (as found in Print-Limit Pro). The SQL statement must contain `{cardnumber}`, which will be replaced with the card number to find.

   An example select query that looks up a card number and returns a username is:

   ```
   select user_name from users_table where card_number = {cardnumber}
   ```

   An example select query that looks up a card number and returns an indentity number is:

   ```
   select user_id from users_table where card_number = {cardnumber}
   ```

> **Note**
>
> The `{cardnumber}` replacement does not require quotations (it is sent as a parameter). This also serves to prevent SQL injection attacks sent via card numbers.

6.8.2. Testing

To test the lookup is working as expected:

1. Navigate to the **Users** tab.
2. Pick a card number from your external database that maps to a user in Print-Limit Pro.
3. Enter this card number in the **Quick Find** field and press **Go**.
4. Verify that the matching user is displayed. If the expected user is not displayed check the **App. Log** tab for errors.

6.9. Disabling user printing with time latches

Print-Limit Pro allows printing to be disabled for particular users using time-based locks. These time latches allow a user's printing to be disabled for a predetermined amount of time. After this time has passed, the user's printing is re-enabled without the need for manual intervention. Some examples of where time latches may be useful include:

- Student discipline - Under some circumstances it might be useful to disallow printing for a student who has been misbehaving in class, abusing computer resources or for other disciplinary reasons. The user's printing can be disabled for the duration of a class, or indefinitely. Once the time period has passed, printing will automatically be enabled for this user.

- Classroom Management - Using the bulk user actions screen, printing can be disabled for a group of users. This can be useful to stop a classroom from printing for a period of time.
- User Management - If a employee or student is away for an extended period of time and may return, printing can be disabled so that their details and balance is unchanged but no-one can use their account for printing.

The disable printing option is located on each user on the user details screen.

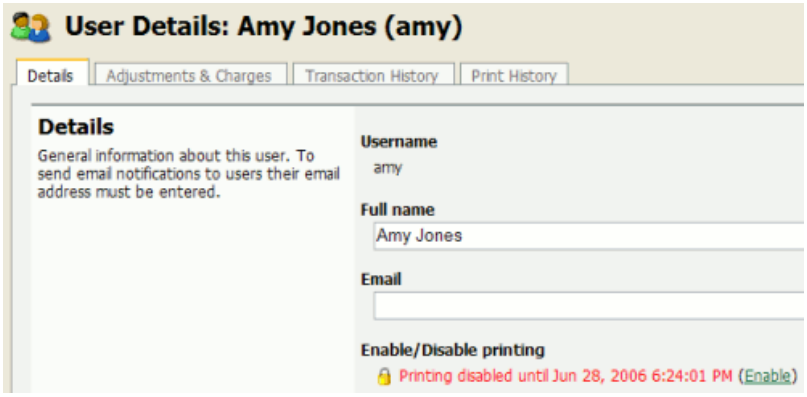


Figure 6.5. User printing disabled using a time-latch

6.10. Office/Department History

Print-Limit maintains a historical record of changes to users' office and department fields. Print-Limit cross-references job logs against these histories so that it can report print usage by the office and department a user belonged to at the time they printed a job. Normally this happens in the background and there is no need to be aware that it is happening.

There are some cases where a user's office or department will have been updated incorrectly in the user directory, e.g. updated too late, or changed to the wrong name. These changes will reflect how user activity is reported by Print-Limit. To ensure that information is reported correctly, the changes that were made incorrectly can be retrospectively altered. The most common cases where alteration might be required are described below.

> **Note**
>
> A user's office and department history are synchronized from the user directory into Print-Limit, and not the other way around. Therefore it is important that the details in the user directory are updated before making historical changes in Print-Limit. Print-Limit automatically synchronizes these details overnight, however a change can be made in the same day by running a manual synchronization via **Options** → **User/Group Sync** → **Synchronize Now**.

6.10.1. Scenario 1: Correcting a late change to a user's office or department

User `peter` moves from the Science department to the Medicine department on 14 May but the user directory is not updated with the change until 28 May. The Print-Limit administrator Jane notices that Peter's activity between 14 and 28 May has been incorrectly allocated to his old department, Science. Luckily Jane can alter history, and she does so as follows:

1. Navigates to **Users** → **peter**.
2. Clicks **View/edit history** below the **Department** field.

Figure 6.6. View/edit department history link on User Details page

3. The **Department history** screen is displayed, including the department change on the incorrect date of May 28.

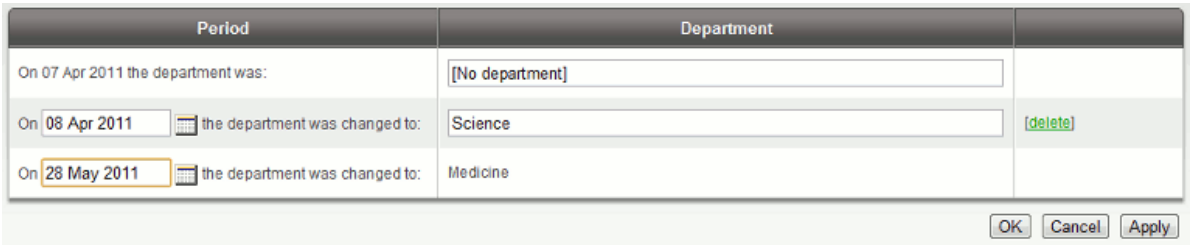


Figure 6.7. Department history page with date to change highlighted

4. Jane finds the row where the department was changed to `Medicine` on the incorrect date (`On 28 May 2011...` in the screenshot below), corrects the date and clicks **Apply**.
5. Peter's department change has now been retrospectively updated to 14 May. Reports now show Peter's activity being allocated to the `Medicine` department after this date.

6.10.2. Scenario - Correcting an unintended office or department change

On April 9 Peter joins the Medicine department. At the time, his department's administrator entered the department name into the user directory as `Medical Department`, where the correct name should have been `Medicine`. The Print-Limit administrator Jane realizes this mistake on April 28 and updates the user directory.

Print-Limit now displays Peter's activity between April 9 and April 28 as being allocated to the incorrect department `Medical Department`. To correct this, Jane performs the following actions:

1. Navigates to **Users** → **peter**.
2. Clicks **View/edit history** below the **Department** field.

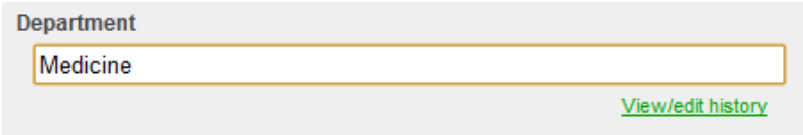


Figure 6.8. View/edit department history link on User Details page

3. The department history screen is displayed, and shows the incorrect department change on April 9.
4. Jane clicks the **delete** link in the row of the incorrect department change `Medical Department`.

Figure 6.9. Link to delete a historical department (or office) change.

5. The incorrect department change has now been deleted, leaving the new department `Medicine` as active since April 28.

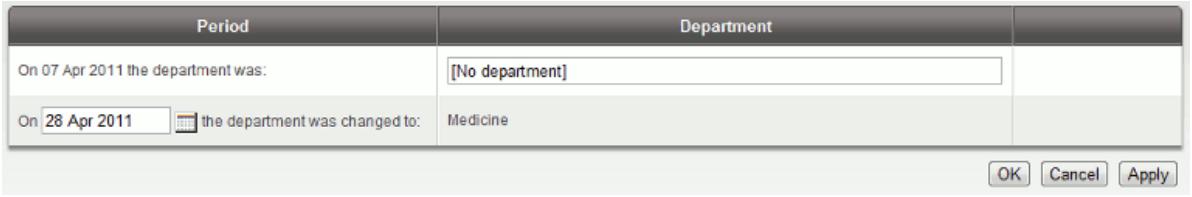


Figure 6.10. Department history page after having deleted a historical change

6. Jane updates the change date of the `Medicine` department to April 9 and clicks **OK**.
7. Reports will now consider `Medicine` as Peter's department since April 9, and the incorrect entry `Medical Department` has been deleted.

6.11. User Management Quick Reference

How do I add credit to a user?

Select the user from the groups list, and click on the **adjust** link next to the credit or select the **Adjustment & Charges** tab.

How do I add a new user to the system?

Print-Limit Pro will automatically add users to the system the first time they print. If your new user initial settings rules are defined correctly under groups section, the user will automatically be created with the designated starting credit and settings.

If you have added a large batch of new users, you can force the addition of these users immediately via the **User/group synchronization** option under the **Options** section. For more information see Section 12.3, “User and Group Synchronization”.

How should I make a change to more than one user?

If you need to make a change to more than one user, consider using the **Bulk user actions** link located under either the **User** or **Groups** section. This allows bulk modification of user settings based on their network group membership. See Section 6.4, “Bulk User Operations”.

How do I grant administrator access to a trusted person to manage a group of users?

Administrator level access can be granted to trusted individuals. See Section 4.7, “Assigning Administrator Level Access”. By using advanced access control rights, administrators can be limited to a subset of users (a group) via the option **Limit access to users only in group**.

How can I prevent new users from being added automatically?

See Section 12.3.7, “On Demand User Creation”.

Due to technical reasons I'm unable to create new groups in my domain. Can I create groups in Print-Limit Pro?

Yes. Groups may also be defined via a text file (e.g. a tab-delimited file). Simply place your group definition file at the location `[app-path]/server/data/conf/additional-groups.txt`. See the template file `additional-groups.txt.tmpl` in the same directory for an example and further information.

I have two different networks with different username naming conventions (e.g. j.smith and jsmith). Is this supported?

Yes. There is a username aliases file that can be used to map usernames in one format to the format expected by Print-Limit Pro. Aliases are defined in the file `[app-path]/server/data/conf/username-aliases.txt`. See the comments in this file for more information.

Can I manage my own set of users inside Print-Limit Pro (as well as / instead of importing users from a user directory)?

Yes. Print-Limit Pro is designed to keep user management simple and automated, but it is possible to manage users inside Print-Limit Pro as well as or instead of using users from a user directory. Users managed by Print-Limit Pro are termed *internal users*. For more information see Section 25.1, “Internal Users (users managed by Print-Limit Pro)”.

Chapter 7. Advanced Printer Management

This section covers some of the more advanced printer management tasks. Advanced printer management can be grouped into the following high-level concepts:

- Activity monitoring
- Encouraging appropriate use
- Managing the addition of new printers

This section addresses these management areas and covers tools available in Print-Limit Pro to assist administrators.

7.1. Adding and Removing/Deleting/Ignoring Printers

7.1.1. On Windows

Print-Limit Pro tracks all print queues *local* to the system by default. Local print queues are those that have been set up on the server running Print-Limit Pro with a local port, such as: a TCP/IP connection to a network printer, an LPR connection, or a printer attached locally via USB or LPT. Standard Windows print queues that are hosted on a different system, or “re-shared”, are not tracked (these queues may be tracked by setting up a *secondary print server*, see Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers*).

New print queues added to the system should show up automatically in Print-Limit Pro, however in some rare situations the printer may only show up after the first print job has been sent.

Under some situations it may not be desirable to track all printers. Some examples of why an administrator may choose not to monitor a printer include:

- The printer is a “virtual printer” such as a PDF generator, FAX, or document management program.
- The administrator may wish to offer free printing on a selected printer and not be concerned with monitoring (silent monitoring with a zero page cost will also achieve this).
- The printer may not be supported by Print-Limit Pro and may need to be ignored.

The *Print Provider* component is responsible for locating and tracking the printers. To instruct it to ignore a printer:

1. Open the file `[app_dir]\providers\print\win\print-provider.conf` in a text editor such as Notepad.
2. Locate the line `IgnorePrinters=` and enter the full name of the printer on the right-hand-side of the equals line. For example:

```
IgnorePrinters=Office Printer
```

   Note: This is the printer's locally assigned name and not the name of its network share.

   If you have multiple printers to ignore, then separate the each printer name with a comma. For example:

```
IgnorePrinters=Office Printer,Copy Room Printer
```

3. Restart (stop then start) the `Print-Limit Print Provider` component under **Start** → **Control Panel** → **Administrative Tools** → **Services**
4. If the printer data is no longer required for reporting purposes, log into Print-Limit Pro's admin interface and select the **Printers** section, then click on the printer to be removed and select **Delete printer** from the **Actions**

list.

5. Test the changes by printing to the deleted printer and ensuring the printer does not re-register itself in the system. It if does, verify the name assigned under the `IgnorePrinters=` setting is correct.

7.1.2. On Mac

The list of monitored printers is configured when installing Print-Limit Pro. To change the list of monitored printers, run the script at `/Applications/Print-Limit Pro/Control Printer Monitoring.command`. Please read the script's instructions carefully and ensure that the **Print Setup Utility** is closed/quit when running this script.

After running the script, print a test document (i.e. using a text editor or printing a web page from Safari). The act of printing for the first time will register the printer with the primary server. Log into Print-Limit Pro as `admin` and verify that the printers are now listed under the **Printers** section. Perform a test print on each printer and verify that the jobs are tracked correctly.

> **Note**
>
> At the technical level, Mac systems use the Common UNIX Printing System (CUPS). Print-Limit Pro tracks printing by integrating with CUPS. (For system administrators familiar with CUPS, Print-Limit Pro integrates by wrapping or proxying the CUPS backend). The `Control Printer Monitoring.command` script simply edits the file /etc/cups/printers.conf and prefixes the `DeviceURI` with `printlimit:`, enabling monitoring on the selected printer.
>
> System administrators experienced with the terminal may prefer to edit the `printers.conf` file directly with a text editor. See Section 7.1.3, “On Linux” for more details.

To delete a printer:

1. Double click on the `Control Printer Monitoring.command` script.
2. Choose to disable monitoring on the printer(s) to delete.
3. If the printer data is no longer required for reporting purposes, log into Print-Limit Pro's admin interface and select the **Printers** section, then click on the printer to be removed and select **Delete printer** from the **Actions** list.
4. Test the changes by printing to the deleted printer and ensuring the printer does not re-register itself in the system. It if does, verify that it is not being monitored using `Control Printer Monitoring.command`.

7.1.3. On Linux

Print-Limit Pro tracks printing by integrating with the Common UNIX Printing System (CUPS), the printing system on Linux. For a printer to be tracked, CUPS needs to be told to route print jobs through Print-Limit Pro before printing.

To do this, the `printers.conf` file must be edited. This can either be done manually, or assisted via the `configure-cups` script.

To use the script, run the script file at `[app-path]/providers/print/linux-*/configure-cups`. Please read the script's instructions carefully to enable monitoring on the desired printers.

To edit the file manually:

1. Open your `printers.conf` in a text editor such as `vim`. On most Linux distributions `printers.conf` is located at `/etc/cups/printers.conf`.
2. Prepend `printlimit:` to the `DeviceURI` of the printers you wish to track. After the modification a `DeviceURI` line might look like:

```
DeviceURI printlimit:ipp://1.2.3.4/printers/My_Printer
```

3. Restart CUPS in the way appropriate to your distribution. E.g.:

```
/etc/init.d/cupsys restart
```

4. Perform a test print on each printer. This will cause the printers to be registered. This step is not required with the `configure-cups` script, because the script registers the printers automatically.
5. The printers should now be registered. Log into Print-Limit Pro as `admin` and verify that the printers are now listed under the **Printers** section. Verify that the test prints sent previously were tracked correctly.

To delete a printer:

1. Double click on the `configure-cups` script (or manually edit `printers.conf`), and choose to disable monitoring on the printer(s) to delete.
2. If the printer data is no longer required for reporting purposes, log into Print-Limit Pro's admin interface and select the **Printers** section, then click on the printer to be removed and select **Delete printer** from the **Actions** list.
3. Test the changes by printing to the deleted printer and ensuring the printer does not re-register itself in the system. If it does, verify that it is not being monitored using `configure-cups`.

7.2. The Template Printer

The Information Technology field is a rapidly moving environment. Change is driven by two main forces:

- Business and end-user requirements
- Technology advances

It is change that often consumes a network administrator's time. Print-Limit Pro endeavors to alleviate some of the more mundane tasks via automation. The **New User Initial Settings** section under **Groups** assists with the creation of new user accounts. The addition of new printers, although less common, is also inevitable. Print-Limit Pro helps administrators streamline new print setup using a concept of a template. A template is a pattern or initial condition used as a starting point. Print-Limit Pro has a special virtual printer called the `[template printer]`. This is not a real printer, but a special printer used as a template for printers added in the future.

The `[template printer]` is best described by an example:

1. Jane is a network administrator at a local business. She has implemented a print policy across all printers as follows:
   a. The page cost for a standard page is $0.10.
   b. Double sided printing is encouraged with a 40% discount.
   c. A filter exists on all printers to prevent jobs of over 100 pages. This prevents users from holding up the queues with large single jobs.
2. Jane has set up her policy on all existing printers and then adjusted settings on a printer-by-printer basis depending on the type and functions.
3. She has also set up this policy on the `[template printer]`.
4. Two months later Jane adds 4 new printers. No change in Print-Limit Pro needs to take place as the printers automatically set themselves up based on the settings in the `[template printer]`.
5. When Jane has spare time later in the month she fine tunes printer configuration as required.

As the example shows, the template printer not only helps alleviate future configuration work, but also ensures a consistent policy is applied on printers by default. It brings Print-Limit Pro one step closer to the "zero-administration" goal.

It is recommended the administrators take a few minutes to configure the template printer on any network of more than 100 users.

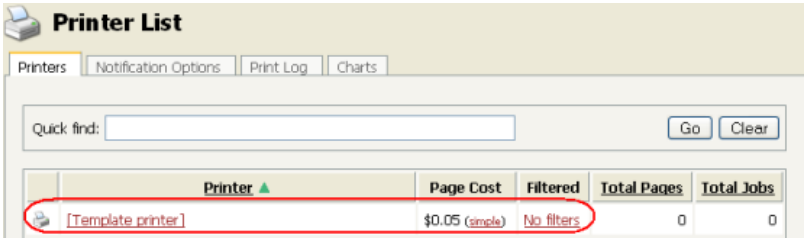


Figure 7.1. The Template Printer

7.3. Copying Printer Settings

Another way to quickly configure printers and have a consistent charging policy is to copy printer settings (costs, filters, etc.) from one printer to another.

Warning

Copying settings to printers is a one-way operation and cannot be undone. Always carefully consider the operation before proceeding. If you are unsure of the function or behavior, performing a backup prior to undertaking the operation is advised.

To copy printer settings from one printer to another:

1. Navigate to the **Printers** tab.
2. Select the printer you wish to copy the printer settings from. The **Printer Details** screen appears.
3. Click the **Copy settings to other printers** action link.
4. Choose which settings to copy. There is a choice of the cost and the filter settings.
5. Select the printers to copy the settings to.
6. Press **Copy** to perform the copy.

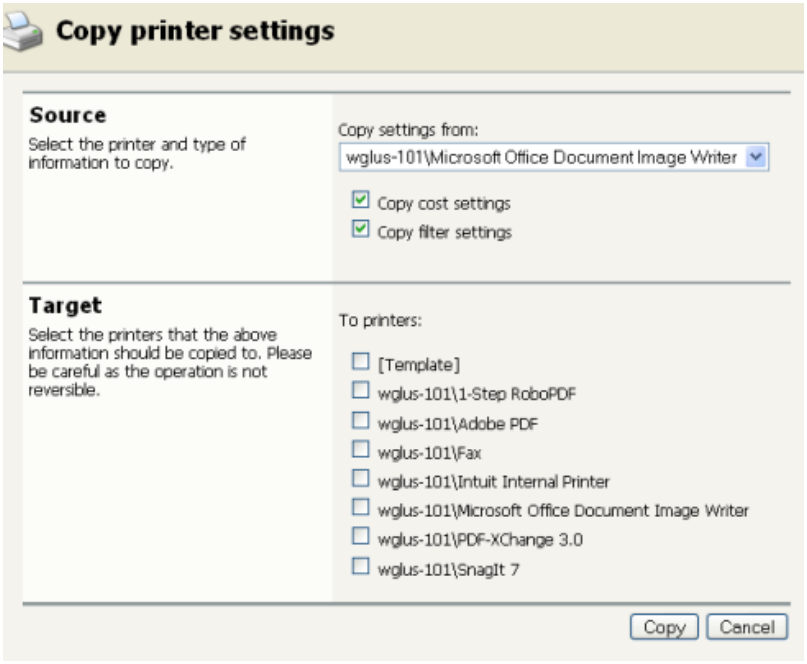


Figure 7.2. Copy settings from one printer to others

7.4. Renaming a printer

To uniquely identify a print queue Print-Limit Pro uses a combination of the hostname the print queue is hosted on and the printer's queue name. If either of these change, for example because if the print queue is renamed, or because the print queue was migrated to a new print server, then a new entry will be created for the **Printer List**. Future print logs will be tracked against the new printer name, and the old printer name will still be available along with all its logs.

In some cases this is the desired behavior. In other cases it may be preferred to rename the "old" printer to its new name so that logs and settings are maintained.

To rename a printer, log into the administration interface and:

1. Select the printer to rename via **Printers** → **Printer List**
2. Click **Rename this printer** from the Actions menu.
3. Enter the new server and print queue name.

Important

The print queue name may not be the same as the print queue's share name. On Windows the print queue name appears in **Control Panel** → **Printers**. On Mac the print queue name can be found on the printer's **Printer Info** sheet under **Name & Location** → **Queue Name**. Take care to enter the name exactly as it appears in the OS, as case sensitivity can be important.

4. If there is already a printer with the chosen name, for example because the print queue has already been renamed in the OS and was automatically added to Print-Limit Pro, ensure the checkbox **If a printer with the new name already exists, delete and replace it** is enabled.
5. Press **Apply**.
6. Perform a test print to ensure that printing is logged under the new name.

7.5. Disabling printers with time latches

A new feature introduced in Print-Limit Pro is time latch based locks. Time latches allow a printer to be disabled for a predetermined amount of time. After the disable time has expired, the printer is re-enabled without the need for manual intervention. Some examples of where time latches may be useful include:

- Printer maintenance - A printer may be consistently jamming and require maintenance. The administrator can lock the printer for 24 hours until the maintenance is performed. Users receive a notification message if they try to use the locked printer.
- Classroom management in schools - A teacher may wish to disable printer use to force students to focus on their work for the duration of the class. The printer can be locked for the duration of the class. After the class has finished the printer is re-enabled automatically ready for the next class.

The disable option is located on each printer under the printer configuration area.

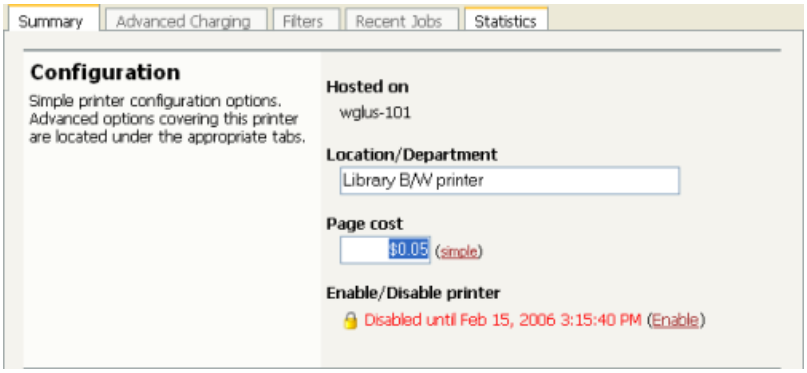


Figure 7.3. Printer disabled using a time-latch

7.6. Managing printing using differential charging

In a quota-based or charged environment, one of the most important tools at the administrator's disposal is the ability to charge different amounts for different types of documents or on different types of printers. Printers are designed for a particular task and a particular work rate. For example an inkjet color printer is ideal for photos or the occasional color page but should not be used print 1000-page black and white documents when the heavy duty laser printer is located just down the corridor.

Print-Limit Pro allows administrators to:

- Charge different cost-per-page amounts for each printer
- Charge different amounts based on the type of document including:
  - Discounts for black and white printing
  - Discounts for double-sided or duplex printing
  - Different amounts based on the size of the page

Administrators can use differential charging to encourage users to use the correct printer and printer settings for the task at hand. This ensures maximum utilization of the resources available.

Example: David is a network administrator at a local university. The printer comparison charts in Print-Limit Pro suggest that one of the printers on the 4th floor in the computer science wing is only used half as much as other printers. Upon investigation he finds that students prefer to use the closer printer located in the corridor outside the lab. David decides to relocate the printer at the end of semester. In the meantime he encourages its use by reducing the price thereby taking load off the other printers.

7.6.1. Charging modes available

Print-Limit Pro offers a very powerful array of charging rule possibilities. To help simplify configuration, charging options are divided into modes.

7.6.1.1. Simple Mode

Simple mode is the default mode and is appropriate to all types of printers. It allows administrators to define a simple cost-per-page setting only. For example if the cost per page was defined at $0.10, 50 pages would cost $5.00.

7.6.1.2. Charging by Category

Category based charging is the most commonly used mode for printers that support advanced print attributes including:

- Duplex or double-sided printing
- Color or Black & White printing modes
- Multiple paper trays offering standard and large sizes

Category based charging allows administrators to define costs based on the document's attributes. Black and white (grayscale) documents can be granted a discount over full color. An option also exists to discount and encourage double-sided printing. Discounts can be applied either as fixed amounts or as a percentage of document cost.

A practical example, Mary has a color printer that supports letter and legal paper and duplex. She would like to define rules to:

- Charge $1.00 per page for letter (standard size) color printing.
- Charge $0.40 per page if the users select grayscale (black & white) - a $0.60 discount for grayscale
- Charge an extra $0.80 if they use large legal size paper
- Offer a 50% discount for duplex to encourage double sided printing.

To accomplish this complex set of charging rules, Mary should setup the Advanced charging options for the particular printer as defined in the screenshot below.

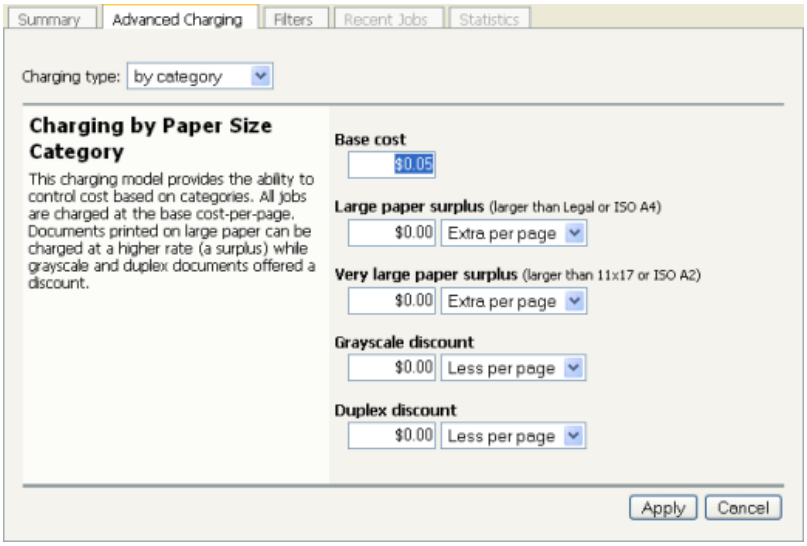

Summary
Advanced Charging
Filters
Recent Jobs
Statistics
Charging type: by category
Charging by Paper Size Category
This charging model provides the ability to control cost based on categories. All jobs are charged at the base cost-per-page. Documents printed on large paper can be charged at a higher rate (a surplus) while grayscale and duplex documents offered a discount.
Base cost
$0.05
Large paper surplus (larger than Legal or ISO A4)
$0.00 Extra per page
Very large paper surplus (larger than 11x17 or ISO A2)
$0.00 Extra per page
Grayscale discount
$0.00 Less per page
Duplex discount
$0.00 Less per page
Apply
Cancel

Figure 7.4. Advanced differential charging example

7.6.1.3. Charging by Paper Sizes

The charging by paper size mode is designed for printers with multiple trays and a variety of available paper sizes. Administrators have full flexibility to define cost for each of the paper sizes support by the printer. For example, printing a letter size page would cost less than printing a legal size page. This mode includes options to enable discounts for grayscale and/or duplex jobs. Discounts can be applied either as fixed amounts or as a percentage of document cost.

7.6.1.4. Charging by Paper Area

This mode is designed for plan printers, plotters or printers that support a variety of paper sizes. For example, many engineering firms use these types of printers for plotting CAD design diagrams. Charging by area allows the cost of the print job to be a function of the paper area.

7.6.1.5. Charging by Paper Length

This mode is designed for plotters or printers that use a paper roll or fixed width media. Charging by length allows the cost of the job to be a function of the paper/plot length.

7.6.2. How duplex discounts are calculated

Many of the supported cost modes allow a discount to be applied to printing duplex documents. The discount is entered as either a percentage or a constant amount per page. It is important to understand that Print-Limit Pro counts a single *side* of printing as a one page. For example, if you have a 50 page Word document, Print-Limit Pro will count this as a 50 page document, whether it is printed single-sided or duplex.

When calculating the cost of a job, the duplex discount is only applied to pages when there is printing on both sides of a sheet paper. If a document contains an odd number of pages, the duplex discount is not applied to the last page. For example, if a 11 page document is printed as duplex, the duplex discount is applied to the first 10 pages, but not the last page.

Some printers allow multiple copies of a document to be printed as a single job. Print-Limit Pro will calculate the cost using the above rules. i.e. If a copy contains an odd number of pages, it will not apply the discount to the last page of each copy.

7.7. Using filters and restrictions

Print-Limit Pro offers advanced filter options to provide network administrators with the ability to filter or restrict print jobs using a set of rules. Filtering options available include:

- Restrict printer access to one or more user groups
- Detect and delete duplicate print jobs
- Define the maximum cost of a single print job
- Define the maximum number of pages allowed in a single print job
- Filter documents based on the file extension or name
- Allow only selected paper sizes
- Set a printer to allow only color or black and white documents

Each printer has its own set of restrictions. The rules can either apply to all users or **restricted** users only (the filter scope). You access these settings by selecting the appropriate printer in the charging list and clicking the **Filters & Restrictions** tab.

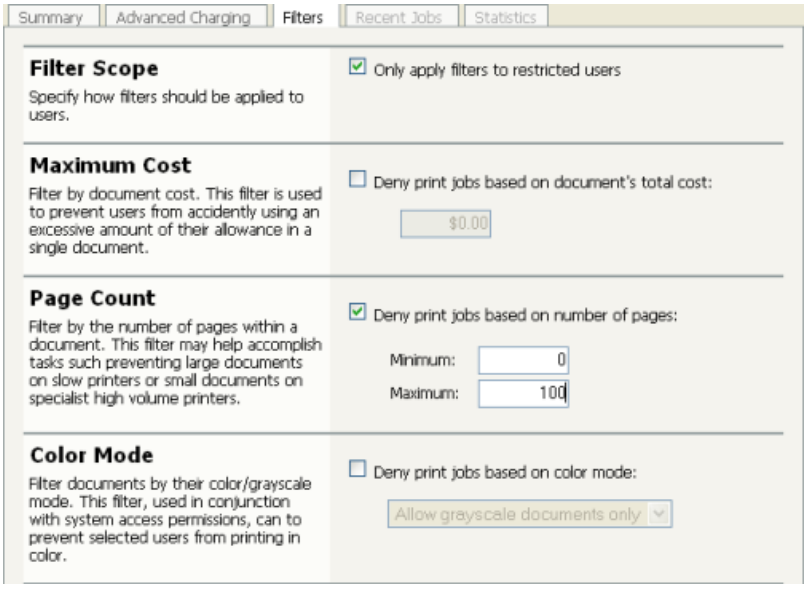

Summary
Advanced Charging
Filters
Recent Jobs
Statistics
Filter Scope
Specify how filters should be applied to users.
Only apply filters to restricted users
Maximum Cost
Filter by document cost. This filter is used to prevent users from accidently using an excessive amount of their allowance in a single document.
Deny print jobs based on document's total cost:
$0.00
Page Count
Filter by the number of pages within a document. This filter may help accomplish tasks such preventing large documents on slow printers or small documents on specialist high volume printers.
Deny print jobs based on number of pages:
Minimum:
0
Maximum:
100
Color Mode
Filter documents by their color/grayscale mode. This filter, used in conjunction with system access permissions, can to prevent selected users from printing in color.
Deny print jobs based on color mode:
Allow grayscale documents only

Figure 7.5. Some of the available printer filters and restrictions

The printer restrictions provide network administrators with advanced control over printer usage. Some common examples include:

7.7.1. Reduce printer jams

Many printers expect print jobs to be on single size of paper, or maybe two sizes if the printer has multiple paper trays. A non-standard size will cause the printer to enter a *manual load* state causing the queue to halt. Print-Limit Pro **Filters & Restrictions** section allows Administrators to select the allowed sizes. Non-standard sizes are automatically deleted before they're sent to the printer. It's an effective way of reducing one of the most common causes of queue jams.

7.7.2. Controlling documents on slow Inkjets

Inkjet printers have very low throughput rates. A large color document can hold up a queue preventing other users from getting their "fair share" of print time. By setting an upper page count via the printer's **Filters & Restrictions** section, network administrators can prevent large print jobs. The page count forces users to split up large documents and allows other users access to the printer.

7.7.3. Automatically deleting duplicate jobs

Print-Limit Pro can also monitor the print queues and automatically delete duplicate print jobs. This option is useful on networks with novice users. New users often "double click" an application's printer icon causing two identical print jobs to be sent to the queue. This wastes paper and users' print quota. Network administrators can enable duplicate job detection via the **Filters & Restrictions** section. A popup message warns the user and the duplicate job is removed from the queue.

Important

This option can affect multiple prints from Microsoft Excel and some other applications. Users wishing to print multiple prints from Excel may need to reprint the document 30 seconds apart.

7.7.4. Force sensible use

Restrictions can be set to define a maximum cost per job. This will prevent users from accidentally spending all their

credit/quota in one print job.

7.7.5. Automatically deny documents based on file extension or name

There are many reasons why users should not print certain files. For example, maybe a report from the accounting application consists of 400 pages. Users may not be aware of this and "accidentally" print the report expecting only a few pages. Print-Limit Pro can be configured to match this document via its name and automatically delete it from the queue. Use the **Filters & Restrictions** keyword filter to implement this functionality.

Additionally it's also possible to filter documents based on file extension by entering a keyword like `.htm` or `.pdf`.

To filter a document name based on a regex (regular expression), enclose the keyword in forward slashes. Note that the regex matches the entire document name. For example:

- To disallow printing of any documents ending in `.htm`:

```
/.*\.htm/
```

- To disallow printing documents of the form `account-12345.pdf`:

```
/account-\d*\.pdf/
```

Important

This is *not* a security option. It is easy to circumvent the filter by simply renaming the document. Some systems may not even report type information!

7.7.6. Control who can print in color (Advanced)

To control which group of users have access to color printing to a particular printer use one of the following methods:

Method 1

1. On the print server, create a print queue.
2. Share the print queue as normal.
3. Add the printers to Print-Limit Pro and define appropriate costs.
4. From the printer's **Filters & Restrictions** tab in Print-Limit Pro select the groups which should have accesss to color printing via **Groups With Color Access** restriction.

For example:

- To only allow group "staff" to print in color to this printer.

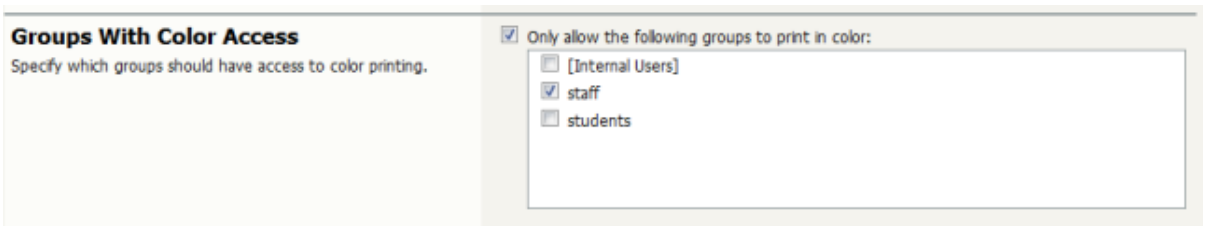

Groups With Color Access
Specify which groups should have access to color printing.
Only allow the following groups to print in color:
[Internal Users]
staff
students

Figure 7.6. Select "staff" from the list of groups

Method 2

This method utilizes two print queues, each with different driver defaults. One queue is set to grayscale only and the other have full color access. Group access is used to control who has access to the color queue.

To implement:

1. On the print server, set up two print queues that point to the same physical printer. Call one queue *Grayscale Only* and the other *Color*. You will now have two printer icons (logical printers) each connected to the same physical printer.
2. Share the printers as normal.
3. Set Windows access permissions on each queue as required. Users that require color access should be able to print to the color printer. Other users should only be provided access to the "black and white" only printer.
4. Add the printers to Print-Limit Pro and define appropriate costs.
5. From the printer's **Filters & Restrictions** tab in Print-Limit Pro ensure that the **Color Mode** restriction is configured to **Allow grayscale documents only** on the grayscale printer.

This method although being more complex to manage, sometimes offer better user experience as users do not need to select driver color and black and white options for each print.

7.7.7. Advanced Setups

Print-Limit Pro provides printer management features that can be easily extended to more advanced network setups including:

- Environments with multiple print servers
- Monitoring of locally attached network printers.
- Central monitoring over Wide Area Networks (WAN) or VPN.

These topics are an advanced subject and covered in subsequent sections.

Tip

For more flexibility in filtering print jobs, one should consider the Advanced Scripting capability. With Advanced scripting, one can filter on more attributes of a print job. See Chapter 16, *Advanced Scripting (Print Scripting)* for more details.

7.8. Managing printer groups

Administrators use groups to manage large number of users. Groups are used for all manner of purposes such as reporting, access control and management. Print-Limit Pro also offers the ability to group printers offering administrators the same level of management advantages they get from user groups. Printer groups are most useful for organizations with a medium to large number of devices.

Printer groups allow administrators to tag or group printers by attributes. Group names are user definable and may represent any attribute appropriate for printer management. Examples include printer type, location, make, function, owner, age, etc. Print-Limit Pro's grouping is implemented using text based "tags" offering similar flexibility to that seen in many modern online systems such as Flickr - the popular photo management website.

Some examples of where printer groups may be useful include:

- Grouping by printer type allowing an organisation to compare volume on inkjets vs. laser printers.
- Grouping by floor, departments, or work areas providing comparison reports to identify areas that may need additional printers.
- Quickly locate printers by attributes or tags defined by administrators.
- Implement fine grained access control by ensuring administrators can only apply adjustments to devices under their ownership/responsibility.
- Facilitate group-level management of devices settings such as copying new rules, costs and policies between like devices.

To group printers that support color output the admin will follow the following procedure:

1. Locate and click a color printer via the **Printers** tab.
2. On the printer details screen scroll down to the **Printer Groups/Tags** section.
3. Enter an appropriate group name (tag) such as `Type:Color`. Read best practises in Section 7.8.1, “Suggested best practises for naming printer groups”

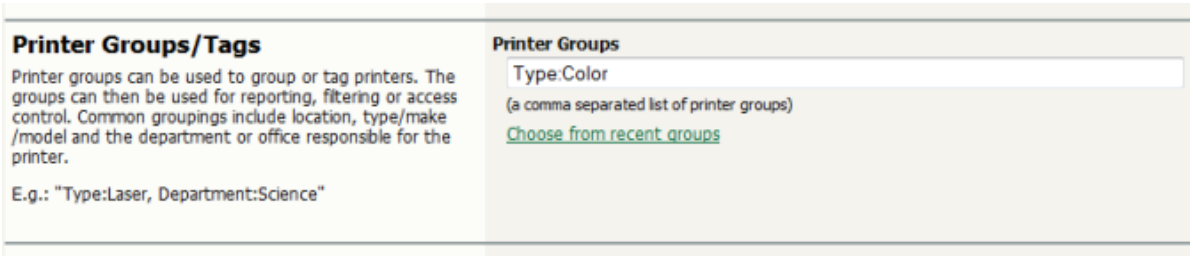

Printer Groups/Tags
Printer groups can be used to group or tag printers. The groups can then be used for reporting, filtering or access control. Common groupings include location, type/make /model and the department or office responsible for the printer.
E.g.: "Type:Laser, Department:Science"
Printer Groups
Type:Color
(a comma separated list of printer groups)
Choose from recent groups

Figure 7.7. Adding a new printer group "Type:Color"

4. Click **OK** to save the change.
5. Repeat step 1 and 2 selecting another color device.
6. This time select **Choose from recent groups** and click `Type:Color`.

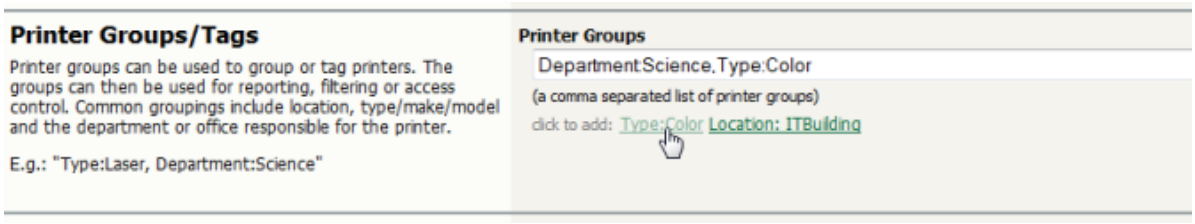

Printer Groups/Tags
Printer groups can be used to group or tag printers. The groups can then be used for reporting, filtering or access control. Common groupings include location, type/make/model and the department or office responsible for the printer.
E.g.: "Type:Laser, Department:Science"
Printer Groups
Department:Science,Type:Color
(a comma separated list of printer groups)
click to add: Type:Color Location: ITBuilding

Figure 7.8. Adding an existing printer group

7. Repeat step 6 for all color devices.

Tip

An alternate method to apply a set of printer groups to multiple printers is to use **Copy settings from printer to printer** action.

7.8.1. Suggested best practises for naming printer groups

An important requirement of group management is to have clear and consistent naming conventions for your groups. This convention needs to be followed by all involved in group management leveraging the **Choose from**

recent groups link is a good way to ensure consistency. A group name may contain any character except for ",". Administrators are encouraged to use a key-colon-value format such as:

- Type:Laser
- Location:Floor1
- Department:Science
- Subnet:192.168.4.*
- Office:NewYork

Prefixing the value with a type makes it easier to compare and locate groups of interest.

Like user groups, it's important to keep printer groups up-to-date. Ensure someone is tasked with assigning printer groups when new devices are added to your network.

7.9. Cost Adjustments

Cost Adjustments are used in conjunction with the User Client's Advanced Popup (see Section 8.4.2, “Advanced Account Selection Popup”) or Manager Popup (see Section 8.4.3, “Manager Mode Popup”). They allow an administrator to define a user selectable list of adjustments to apply to the current print job. These adjustments can be in the form a percentage adjustment, a per job fixed adjustment or a per page adjustment. Charge Rates are commonly used in the Engineering and Architectural Drafting fields. Examples include:

- Charging different rates for premium print material. For example 150% for use of Mylar drafting film.
- Offering a discount of selected situations. A 2nd copy of an architectural plan printed on draft quality paper may be charged at 50% normal rate.
- Charging a fixed cost for services like document binding. For example, binding might cost an additional $5.00.
- Increasing the per-page cost of a job for color paper (e.g. an additional $0.20 per page).

Cost adjustments are defined at both a global and printer level - allowing common adjustments to be applied globally to all printers, with the flexibility to also define printer specific adjustments. The adjustments are defined in the format:

```
adjust1:100%, adjust2:150%, adjust3:3.0pj, adjust4:0.10pp, adjust5:1.0pc
```

(A comma separated list of rates in the format of "Name" and "Amount" separated by a colon). The first rate listed is the default rate and is automatically selected in the Advanced Client Popup. The format of the "Amount" depends on the type of adjustment. Each of the formats is defined below:

Type	Description	Format	Examples
Percentage	Applies a percentage adjustment to the job cost. Rates above 100% will increase the cost, while those below 100% will discount the job. (NOTE: When multiple adjustments are applied with the manager popup, the percentage adjustments are applied last)	`0.00%`	`120%` - increases cost by 20% `75%` - discounts the cost by 25% `0%` - sets the cost to zero
Per Page	Adds/subtracts a fixed amount to each page in the job.	`0.00pp`	`0.10pp` - increases cost by $0.10 per page `-0.05pp` - reduces cost by $0.05 per page
Per Job	Adds/subtracts a fixed amount to the total job cost.	`0.00pj`	`3.00pj` - increases total cost by $3.00 `-1.00pj` - reduces total cost by $1.00
Per Copy	Adds/subtracts a fixed amount to each	`0.00pc`	`3.00pc` - increases total cost by

Type	Description	Format	Examples
	copy in the job.		$3.00 per copy `-1.00pc` - reduces total cost by $1.00 per copy

Table 7.1. Cost Adjustment Types

If the option **Always require manual selection** is enabled then the default selected rate will read “Select...”, requiring that users manually select a charge rate every time they print.

Global cost adjustments are defined in **Options** → **Client Software**. These will be available for all printers. Any adjustments defined at the printer level will be in addition to the global adjustments. The printer level adjustments are defined in **Printers** → **Summary** → **Advanced Configuration** → **Define cost adjustments**. If an adjustment with the same name is defined at both the global and printer level, the printer adjustment takes preference.

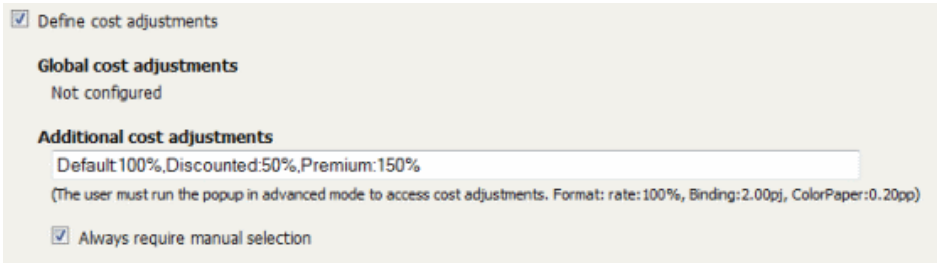

Define cost adjustments
Global cost adjustments
Not configured
Additional cost adjustments
Default:100%,Discounted:50%,Premium:150%
(The user must run the popup in advanced mode to access cost adjustments. Format: rate:100%, Binding:2.00pj, ColorPaper:0.20pp)
Always require manual selection

Figure 7.9. Three cost adjustments defined at the printer level

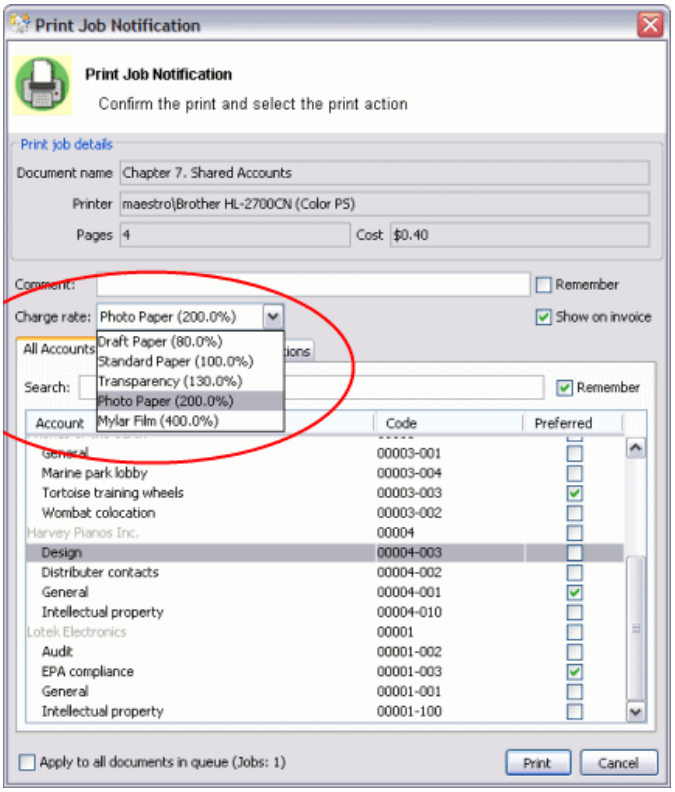


Figure 7.10. Cost adjustments displayed in the Advanced Client Popup

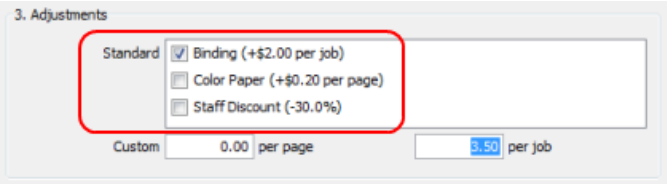


Figure 7.11. Cost adjustments displayed in the Manager Mode Popup

7.10. Popup Authentication

Print-Limit Pro normally relies on the underlying operating system and the associated print queues to perform authentication. For example, in normal operation, a user logs into a workstation using a domain/network level authentication method such as a username and password. The print queues also use this authentication and Print-Limit Pro can trust the supplied identity. However in some network environments, relying on network level authentication may either not be possible, or may not be reliable. Common examples include:

- All users log in with a common generic username and password meaning that it's not possible to distinguish between users.
- A print queue that does not enforce authentication.

For a detailed explanation of print authentication, please Chapter 22, *Print Authentication*.

7.10.1. Where Popup authentication is used

Some real life examples covering these two situations include:

7.10.1.1. The Student Lab

Some student labs are set up so everyone logs in using a generic username and password. For example, username: student, password: student. This is common in Apple Mac labs, where enabling multi-user authentication is complex and can often prevent selected applications from running correctly.

7.10.1.2. LPR/LPD or CUPS

The Line Printer Daemon print protocol, often used in UNIX environments, is a non-authenticated system. The username associated with the print jobs is passed through to the print queue, however the name is not verified and can easily be forged. An extra level of authentication is required.

CUPS, the modern print system often used on Linux, Apple Mac and some Unix systems, is often implemented in a non-authenticated fashion. Although CUPS can support authentication, technical considerations such as the inability to interface with Active Directory domain authentication often prevent its use.

7.10.1.3. Mac Print Queues

Mac OS X server use the CUPS print system. Current Apple implementations prevent administrators from enabling CUPS authentication. This is not usually a problem in an environment where logins can be controlled at individual workstation level. It does however pose a problem if users have local admin access - for example, individual owned laptops. Print-Limit Pro popup authentication provides a way to work around the non-authentication issue.

More information, including a discussion of platform specific issues is available in Chapter 22, *Print Authentication*.

7.10.2. How does popup authentication work?

The popup authentication works by authenticating the user via the Print-Limit Pro client software. The client software pops up a window requesting the user's username and password. The password is sent to the server via an SSL encrypted connection and is validated. On successful validation, a session is formed that associates the user with this workstation. The session is valid for a length of time as selected by the user - the default being 5 minutes - or until the user logs out.

7.10.3. Macs and popup authentication

Popup authentication is often required on Mac networks supporting a mix of lab systems authenticated via a directory service and unauthenticated laptop systems. Advance administrators may wish to review Section 23.3, “Eliminating PopUp Authentication via Mac Login Hook” to streamline login on the secured lab systems.

7.10.4. Configuration

The following sections cover how to enable popup authentication on either the user account level or the print queue level.

7.10.4.1. Popup authentication and generic user accounts

The following notes explain how to enable popup authentication when a user logs in under a generic user account - for example, `student`.

- Add the account to the domain called `student`. You may already have such as account set up.
- Perform a **User/Group Sync** or print a job from this account so the username is listed in Print-Limit Pro
- Select the generic user and set the account to a *zero balance* and a *restricted* status. This will ensure that users can't charge against this account.
- Check the **Unauthenticated** option and click on the **Apply** button to save the changes.

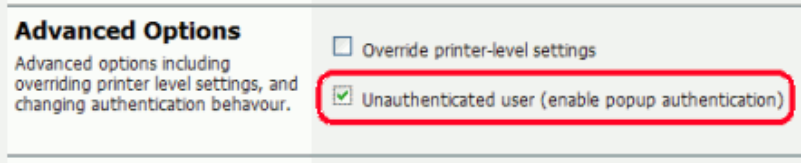

Advanced Options
Advanced options including overriding printer level settings, and changing authentication behavour.
Override printer-level settings
Unauthenticated user (enable popup authentication)

Figure 7.12. Turning on popup authentication at the user level

- Install client software on workstations. See Section 5.2, “User Client” for details.
- When a user logs in as the generic `student`, they will be prompted for their domain level username and password.

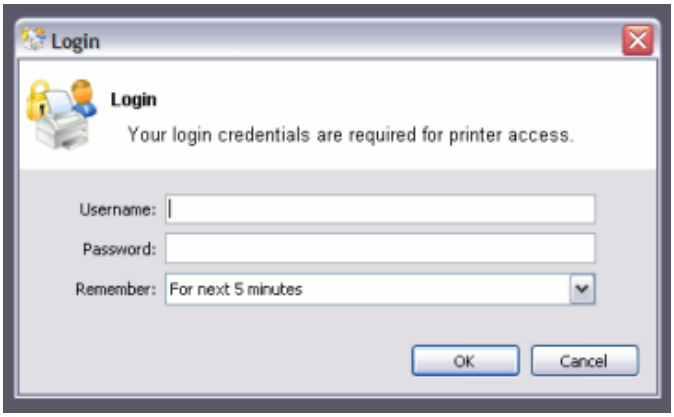


Figure 7.13. Print-Limit Pro client requesting for authentication

7.10.4.2. Popup authentication on a print queue

The following notes explain how to enable popup authentication when a user attempts to print to a non-authenticated printer such as one hosted via an LPR/LPD queue or a CUPS print queue:

- Add the printer to the system and normal. Perform a few test prints to ensure the printer is functioning and

tracking as expected.

- Log into Print-Limit Pro and check the **Unauthenticated** option under the relevant print to enable the popup authentication.
- Install the client software on any workstation that will print to this printer. See Section 5.2, “User Client” for details.
- When a user attempts to *print* to this printer, they will be prompted for their username and password.

7.10.4.3. User Interaction

When running in popup authentication mode, the client makes available a number of additional options including:

- Logout
- Login as another user

The **Logout** option is available on Windows via either the right-click option on the task try icon, or when running on Mac or Linux, via a right-click popup menu (Option Click) access via the icon on the balance window.

The **Login as...** option is made available if the client starts as an unauthenticated user. This option allows users to authenticate or quickly switch user identity.

7.10.4.4. Advanced Popup Configuration

The login box displayed to the user offers the choice of how long their authentication details should remain active. An administrator can control the options presented to the user by modifying the following system configuration keys. These configuration keys are edited under **Options** → **Actions** → **Config editor (Advanced)**

Config name	Description
client.config.auth.ttl-values	A comma separated list of values to display in the popup authentication login box. Positive numbers represent the number of minutes to remember the authentication for. The value of `0` indicates that the authentication is remembered for "this print job only". The value of `-1` indicates that the authentication is remembered until the user logs out or exits the client. The value of `-2` indicates that the authentication is remembered indefinitely, even after restarting the client. For security reasons the client does not save the password. Instead a server generated *cookie* is placed in a file in the user's home directory. The default is: `1,5,15,30,60,-1`
client.config.auth.ttl-default-minutes	The default time-to-live value automatically selected when the login authentication window displays.
client.config.auth.popup-on-startup-if-unauthenticated	Determine if the client should request authentication when the client starts if the operating system user is unauthenticated. Set to `Y` (yes = enabled) or `N` (no = off).

Table 7.2. User Client Popup Config Keys

Important

User client tools that are already running will pick up changes made via the config editor the next time they are restarted.

Please see Section 12.9, “Using the Config Editor” to find out how to change config keys.

7.11. Color Detection

The color detection setting determines the method used by Print-Limit Pro to analyze documents for the presence of color. Changing the detection method may require some additional printer configuration. Please read this section in

its entirety.

The standard way used by Print-Limit Pro to handle color in documents is to see if the printer's driver has set the `grayscale` flag. When this flag has been set on a document sent to a color printer, the grayscale discount is applied. Otherwise, the document is charged at the printer's standard rate. This may be an inconvenience for users when a large document is printed with just a few color pages.

For example, a user prints a 21 page document to a color printer. The document is all grayscale except for a color header on the first page. When using *standard color detection*, the user is charged for 21 pages at the color printer's standard rate. As a workaround, the user could send the document as two print jobs (one with just the first page containing color, and another with the rest of the document), but this is an inconvenience. An enhanced alternative is to use *page-level color detection*. When this option is selected, the user would be charged for one page at the color printer's standard rate, and receive the grayscale discount for the other 20 pages.

Print-Limit Pro has three options for document color detection:

- Grayscale only (for grayscale printers)
- Standard color detection (also referred to as document-level detection)
- Page-level color detection

The color detection setting is available for each printer controlled by Print-Limit Pro. To access the setting, click on a printer from the **Printers** tab to bring up the **Printer Details** page.

Color detection mode
This is a grayscale printer
This is a color printer (use standard detection)
This is a color printer (use page-level detection)

Figure 7.14. The color detection setting for a printer

'This is a grayscale printer'

This option indicates that the printer is not capable of printing color documents, so color detection should be bypassed. This will ensure that the color page count for this printer is always zero.

'This is a color printer (use standard detection)'

When this option is active, documents are treated as being either grayscale (where a printer's driver has set the grayscale flag) or color. This mode is available in almost all color printers, and is the standard color detection method in Print-Limit Pro. Where users print documents containing both grayscale and color pages, this option encourages users to use color printers only for their color printing.

'This is a color printer (use page-level detection)'

Page-level color detection is a relatively new feature for Print-Limit Pro (introduced in November 2006), and continues to be under active development. This feature scans each page of a document for traces of color. The grayscale discount is applied to any grayscale pages, and other pages are charged at the printer's standard rate.

Currently, Print-Limit Pro can perform page-level color detection with most *PostScript*, *PCL5*, *PCL6* (PCLXL) and *HPGL* printer drivers Many manufacturers offer PostScript and PCL drivers as well as proprietary ones - check your printer manufacturer's website for availability.

Important: To use page-level color detection:

1. Ensure the printer is using a *PostScript* or *PCL* printer driver on both the server *and* workstations.
2. Apply the **page-level detection** option for the printer in Print-Limit Pro.
3. On Windows based servers the `Print Provider` service will be notified of the setting change every 2 minutes. This can be sped up by manually restarting (stop and starting) the `Print-Limit Print Provider` service via **Control Panel** → **Administrative Tools** → **Services**. Linux and Mac systems will pick up the

change immediately.

4. For Windows based servers, *disable* the setting **Enable advanced printing features** on the **Advanced** tab of the printer's Windows Properties page. This option needs to be changed on the print server. This forces documents to spool in the driver's native PostScript or PCL language that Print-Limit Pro can analyze.
5. Print a few test documents with both grayscale and color pages and ensure Print-Limit Pro is correctly charging the document. The **Print Log** under the **Printers** tab is a good place to monitor the detection in real-time.

7.11.1. Limitations of Page-Level Color Detection

Page level detection works by inspecting the contents of the document looking for color use. The aim is to track down simple black and white only pages so it can offer the user the grayscale discount on these pages. There are a few situations that may cause a seemingly grayscale page to list as color - referred to as a 'false positive'. These situations are rare and are discussed below:

- The use of some image formats, even if they look grayscale, may detect as color. For example, JPEG is a lossy format and artifacts as a result of compression may cause speckles of color. Print-Limit Pro will handle most of these situations but grayscale JPEG images in PDF files can cause false positives.
- The use of 'color' white-space in Microsoft Word can cause a false positive with some print drivers. For example, the user selects a color font, enters a single space or new-line, and then changes back to black. Print-Limit Pro in most cases will correctly filter out the 'color space' but may experience problems with some drivers leading to a false positive.

7.12. Validating page counts using hardware checks

Print-Limit provides accurate tracking of printer usage by analyzing the printer spool file on the server. Before the job is sent to the printer, Print-Limit determines the job attributes including the page count, color/grayscale, duplex, paper-size, etc. This up-front analysis allows Print-Limit:

- To calculate the job cost and determine up-front whether the user has enough credit to print.
- To display the job details (e.g. the cost and page count) to the user in the print confirmation screens and release stations.
- To apply filters and policy rules to print jobs (e.g. to disallow non-duplex jobs, or to enforce print policy using the advanced printer scripting).

After the job is queued for printing, Print-Limit logs this print job information and charges the usage to the user.

If the job is sent to the printer but it does not print completely (e.g. if the user cancels the job at the printer), then print job hardware checks allow Print-Limit to determine the actual number of pages printed. These checks are performed at the hardware-level by communicating with the printer via SNMP (Simple Network Management Protocol).

The combination of up-front spool file analysis and post-job hardware verification of the jobs provides the best of both worlds:

- Accurate up-front page count and cost calculations; and
- Verification of the printed pages after the job is completed.

7.12.1. Causes for differences in page counts

The printer may report a difference to the Print-Limit server's spool file analysis for a variety of reasons:

- The user cancels the job at the printer's panel - e.g. LCD screen or cancel button.
- The printer goes into an error state (e.g. out of toner) after the job has partially printed. The administrator may then cancel the job at the printer.
- The print job may have become corrupted, causing the printer to print 100's of pages of junk (e.g. PostScript

code) instead of the user's document!

- Configuration "strangeness" such as the devices double-counting large pages or counting the blank page at the end of a duplex job. Most of these corner-cases have been worked around, however, like all things in Computing, some are bound to show up again!

7.12.2. Requirements

Print-Limit's hardware check use the SNMP protocol to query the page counters of the printer. This is a network protocol supported by most network printers. To support hardware checks the following is required:

- A network printer that supports the SNMP protocol.
- SNMP enabled in the printer (also ensure the "public" SNMP community is enabled).
- The network/firewall allows SNMP UDP packets from the print server to the printers. SNMP uses UDP port 161.
- Some additional configuration of the printer queues may be required. See installation instructions in Section 7.12.4, “Configuring hardware checks”.

7.12.3. How hardware checks work

The Printer SNMP standard allows querying of printer status and page count information over SNMP. Print-Limit makes use of this information to verify the number of pages printed for each print job. This works as follows:

1. Before the print job is sent to the printer Print-Limit confirms the printer is idle (i.e. not printing).
2. A snapshot of the page counters is retrieved using SNMP.
3. Print-Limit waits for the job to complete by querying the printer status and page counts. If the printer is in error (e.g. out of paper), then Print-Limit will continue to wait until the printer error is resolved and the job completes printing.
4. Once the job is completed and the printer is idle, another snapshot of the page counts is taken.
5. The total pages printed is calculated using the differences between the initial and the post-job snapshot.

7.12.4. Configuring hardware checks

Printer hardware checks are not enabled by default in installations of Print-Limit. Enabling the checks requires some configuration within Print-Limit and also some additional configuration of the operating system's printer queues. Hardware checks may be enabled/disabled at the individual printer queue level, or alternatively the settings can be applied to multiple printers using the Section 7.3, “Copying Printer Settings”.

7.12.4.1. Enabling hardware checks

To enable the print job hardware checks:

1. Navigate to the Printers tab.
2. Select the printer to configure.
3. Under the **Advanced Configuration** setting, enable the **Enable print job hardware check** option.

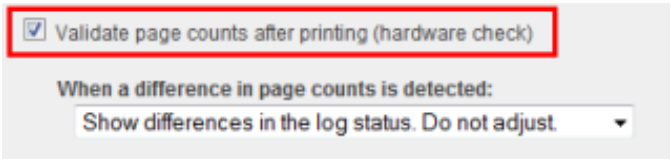

Validate page counts after printing (hardware check)
When a difference in page counts is detected:
Show differences in the log status. Do not adjust.

Figure 7.15. Enabling the hardware check

4. Press **OK** or **Apply** to save the changes.

Important

On Windows print servers, you must also configure the printer to use a **Print-Limit TCP/IP Port**. For instructions see Section 7.12.4.2, “Windows printer queue configuration”.

Tip

On Windows print servers, this setting can take up to 2 minutes to take effect. This can be sped up by restarting the **Print-Limit Print Provider service**.

When a difference in page counts is reported by the printer, the administrator can choose how this is applied to the print jobs. This option is configured using the **When a difference in page counts is detected:** settings as follows:

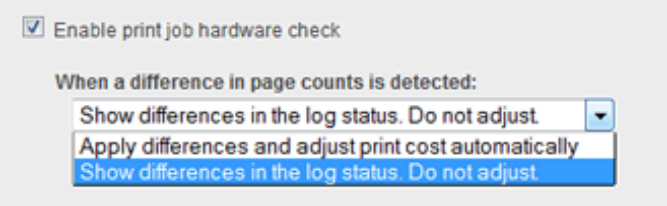

Enable print job hardware check
When a difference in page counts is detected:
Show differences in the log status. Do not adjust.
Apply differences and adjust print cost automatically
Show differences in the log status. Do not adjust.

Figure 7.16. Hardware check adjustment options

'Show differences in the log status. Do not adjust'

The page count differences are recorded against the print job, but no adjustments are made to the page counts or job costs. This is the default option when hardware checks are enabled.

This mode can be useful when you want to use the hardware check information to validate refund request by users. In this case the administrator can verify that a user's job did not complete printing and then refund the job.

The hardware check information is displayed in the print log status and also in the refund screens.

'Apply differences and adjust the print cost automatically'

In this mode, the hardware check information is also recorded on the print jobs as described above. However, any differences in page count and costs will be automatically applied to the job.

For example, if a user printed a 5 page document costing $0.50, and they cancelled the job after only 3 pages were printed, the job cost would be reduced to $0.30 and the user would be refunded $0.20.

In rare situations, it is possible for the hardware check to report an increased number of pages. For example, this might happen when a print job is corrupted and prints out 100's of pages of "junk" instead of what the user printed. In this case the hardware check will report an increased number of pages resulting in an increased cost. By default Print-Limit will not apply the adjustments to the job if the cost would increase.

If you would prefer to apply the differences even if the cost is increased, then select the **Always apply cost adjustments** option.

Tip

To enable the hardware page counts quickly on multiple printers, use the **Copy settings to other printers** action available on the left of screen.

7.12.4.2. Windows printer queue configuration

To perform printer hardware checks, the Windows printer queues need to be configured to use the **Print-Limit TCP/IP Port** type. This port works just like the **Standard TCP/IP Port** that ships with Windows. The **Print-Limit TCP/IP Port** allows Print-Limit Pro to perform the page count checks before and after printing the job.

To configure an existing printer queue to use a **Print-Limit TCP/IP Port**

- Open the **Printers** list
- Right-click on the printer and select **Printer Properties** or **Properties**
- Select the **Ports** tab.
- Press the **Add Port** button.

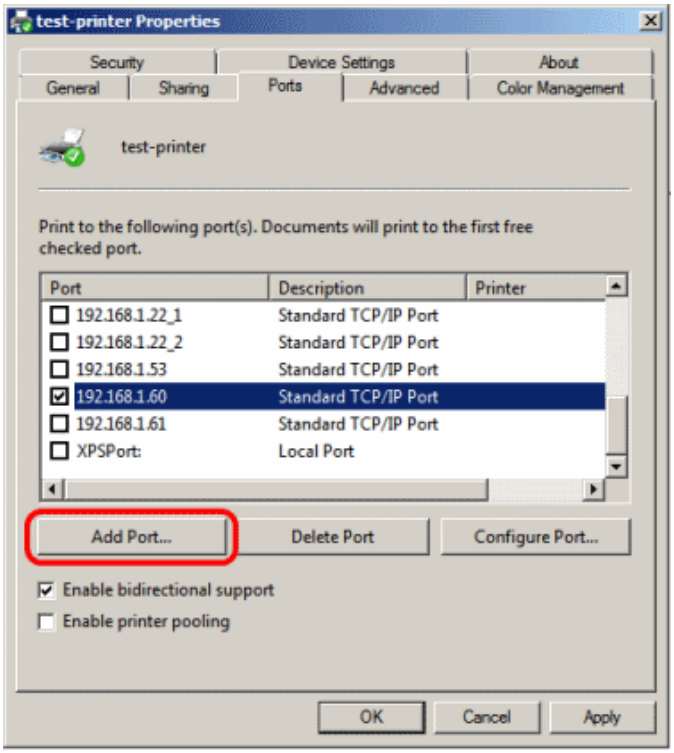


Figure 7.17. Printer properties dialog:

- Select the **Print-Limit TCP/IP Port** option. (Note: if this port does not appear in the list of available port types, then please see Section 7.12.7.3, “Why is the Print-Limit TCP/IP Port not available to be chosen in port selection on Windows?”.)
- Press the **New Port...** button.
- Enter the printer IP address and port name.
- Press **Add Port** to save the new port.
- Press the **Close** button on each dialog window.
- This printer will now be configured to use the new port. The previous port may now be deleted if no longer in use by other printers.

To create a new printer queue to use a **Print-Limit TCP/IP Port**:

- Open the **Printers** list

- Click the **Add a Printer** button.
- Choose to add a **Local printer**.
- When prompted for the printer port, select **Create a new port**.
- Select the **Print-Limit TCP/IP Port** option, and click **Next**.
- Enter the printer IP address and port name.
- Press **Add Port** to save the new port.
- Complete the **Add Printer** wizard as normal choosing the drivers, etc.

7.12.4.3. Novell, Linux and Mac printer queue configuration

When using Novell, Linux or Mac there is no additional configuration of the operating system required for hardware checks to be enabled. This function is controlled via the Print-Limit administration console and will come into affect automatically shortly after the hardware checks are enabled. On Linux or Mac, the hardware checking is supported for the CUPS backends of *socket*, *ipp* and *lpd*.

7.12.5. Reviewing hardware check results

Hardware check results are recorded in Print-Limit on the print log records. When a hardware check is recorded the **Checked** status appears in the **Status** column of the print logs as shown below.

To see the basic details of the hardware check, hover your mouse over the **Checked** status.

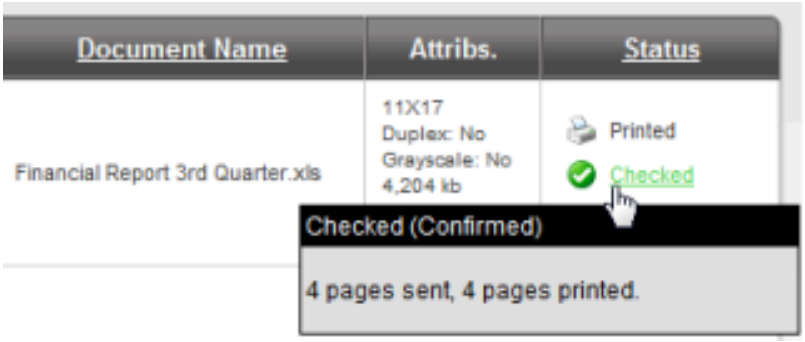


Figure 7.18. Hardware check status

When the hardware check detects a difference, click the **Checked** status link to see more detailed information.

To manually apply hardware checks to a print job (if this is not configured to apply automatically):

1. Click on the **Checked** status.
2. Review the hardware check information.
3. Press the **Apply Differences** button. This will apply the page counts and any cost differences to the print log.

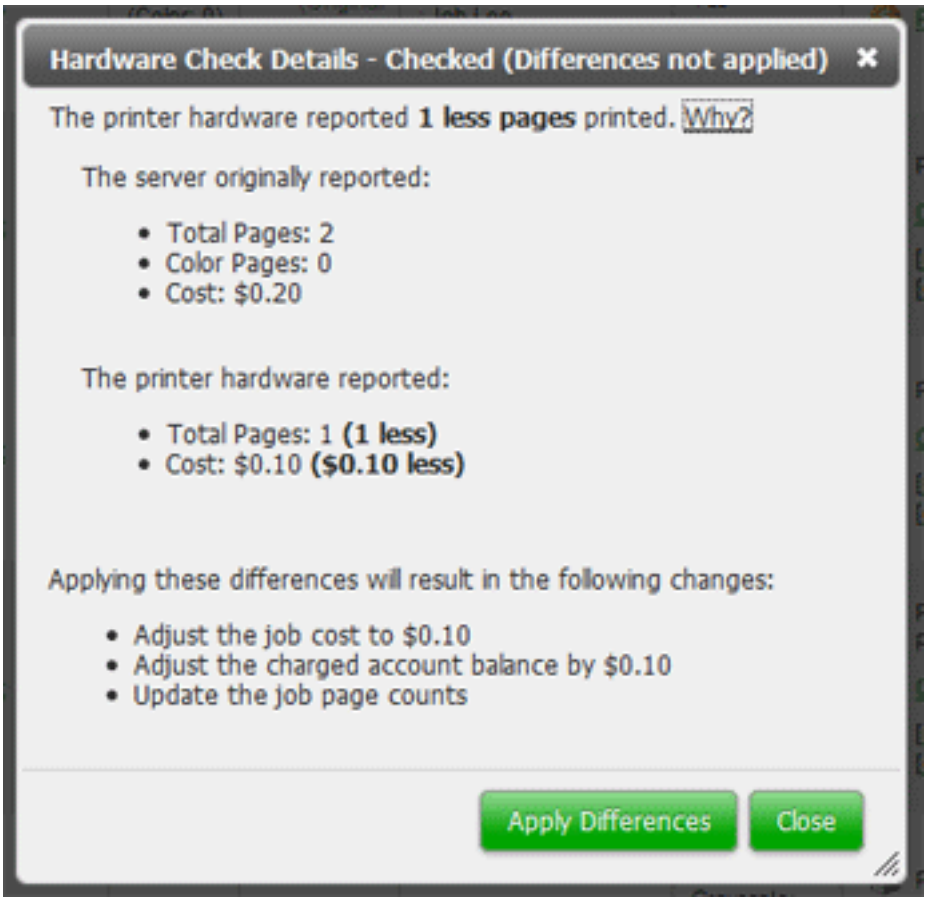

Hardware Check Details - Checked (Differences not applied)
The printer hardware reported 1 less pages printed. Why?
The server originally reported:
Total Pages: 2
Color Pages: 0
Cost: $0.20
The printer hardware reported:
Total Pages: 1 (1 less)
Cost: $0.10 ($0.10 less)
Applying these differences will result in the following changes:
Adjust the job cost to $0.10
Adjust the charged account balance by $0.10
Update the job page counts
Apply Differences
Close

Figure 7.19. Hardware check log status

7.12.6. Known Limitations

Hardware-level page count checks are not enabled by default. Sites should carefully consider these limitations and known issues before implementing:

- The use of the Print-Limit TCP/IP Ports in a Microsoft Clustered Windows Printing Environment should be considered experimental (see Chapter 20, *Clustering and High Availability*, for more information on Clustering in Print-Limit). Clustering is a complex technology and further work is being undertaken to support the Hardware Page Count Checks in a clustered environment. We don't recommend its use in a production environment at this time.
- Hardware-level checks will slow down printing a little (a few seconds between each job). The system needs to take a count snapshot before and after a job. The start/end of a job is detected by the printer entering an idle state and stabilization on some devices can take a few seconds (printing => idle). This process adds a small delay between each job.
- Not all devices support SNMP and even some devices that do, do not support the ability to check page counts at the hardware level. Most major MPF/MFD devices support SNMP, however smaller printer brands may not. We suggest taking some time to test this option across your device type(s) once enabled.
- On Windows, a different Printer Port needs to be installed/configured to support this level of device integration. Care has been taken to emulate the behavior of the **Standard TCP/IP Port**, however some drivers may complain if a non-default port is selected. Although this is rare, it may cause issues with some drivers. Always test the printer after changing the printer port. The development team is looking at ways to remove the dependency on a custom port, however at the current time this method has proven to be the most reliable.
- If you have many printers it's very time consuming to use the Windows GUI to change the ports! Sorry about this,

however we've not found a reliable way to script this process. Our recommended approach is to first test on a representative sample of your devices for a few days, then role the port change out across your fleet. We have found that some good music on the iPod and copious amounts of coffee will help ease the frustration :-)

7.12.7. Troubleshooting

7.12.7.1. The "Checked" status does not appear on any print logs

- Verify that the printer supports SNMP and that SNMP v1 or v2 is enabled in the printer's admin interface.
- Ensure that your networks and firewalls allow SNMP traffic (i.e. UDP port 161) between your print server and printers.
- If using a Windows print server, check that the printer is configured to use the **Print-Limit TCP/IP Port**. See Section 7.12.4.2, “Windows printer queue configuration”
- Verify that hardware checks are enabled in Print-Limit. See Section 7.12.4, “Configuring hardware checks”.
- You can test that Print-Limit can query SNMP data from the printer by running the following in a command prompt or terminal/shell:

```
Windows: [app-path]\providers\print\[platform]\pc-print-monitor.exe -p -h [printer-ip]
Mac/Linux/Novell: [app-path]/providers/print/[platform]/pc-print-monitor -p -h [printer-i
```

If SNMP data can be retrieved, some basic status information will be printed. If not, an error is displayed.

7.12.7.2. Why is the "Checked" status missing on some some print logs?

- An intermittent networking problem between the print server and printer may have stopped the SNMP page counts from being retrieved. E.g. the network was briefly interrupted while Print-Limit was waiting for the print job to finish printing.
- If the job is deleted from the print queue while in progress Print-Limit will cancel any hardware checks and the **Checked** status will not appear on the print log. To avoid this, it is recommended to fix any problems (e.g. out of paper, etc) at the printer and then allow the document to finish printing. This will allow Print-Limit to retrieve the page counts from the printer after the job completes. Only delete the job from the queue if it stays stuck even after the printer error has been resolved.

7.12.7.3. Why is the Print-Limit TCP/IP Port not available to be chosen in port selection on Windows?

- A possible reason why the Print-Limit TCP/IP Port is not available may be because the port was unable to be installed due to a Security Policy disabling the installation of unsigned drivers. A solution for this is to change the Security Policy for the unsigned driver installation behavior to either allow unsigned driver installations or to warn but allow their installation.

7.13. Watermarking/Job Annotation

Watermarking is a feature that allows a small portion of text to be written to the bottom (or top) of every page. Watermarking is a powerful and flexible feature. Typical uses of watermarking include:

- adding a username to the bottom of every page to help identify the owner
- writing job metadata in the footer such as print time, printer or document name
- applying a digital signature to help track and verify documents

Watermark text is defined by the Print-Limit administrator and can be applied to printers individually. Print scripting makes it possible to change watermarks dynamically (see Chapter 16, *Advanced Scripting (Print Scripting)*). Watermarks may contain substitution variables allowing the insertion of document metadata such as date/time, username, document name, etc.

A typical watermark is shown the picture immediately below. This watermark uses the `%user%`, `%date%` and `%signature%` substitution variables described in the Substitution Variables section.

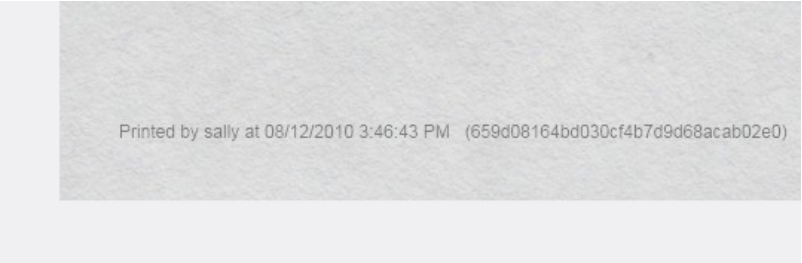


Figure 7.20. An example watermark using variables

Note

Print-Limit Pro watermarks print jobs by modifying the print stream as jobs spool via the print server. The watermark is injected into the job using advanced PDL methods such as macros and overlays. This is the reason why Print-Limit only supports standards based print languages like PCL and PostScript - Print-Limit must understand the job and its data to perform this on-the-fly modification.

Important

Watermarking is a new feature that uses advanced printer techniques that can be implemented differently by each device manufacturer. Please report any problems that you may experience to our support team for investigation.

7.13.1. Typical Uses

1. **Owner Identification.** Add the username to each page so it is easy to find the owner (e.g. uncollected print jobs).

   Suggested Watermark: `Printed by %user%`

2. **Student Assignments.** Add the username and time of printing to each page. This will help teachers match up student work and help students prove that assignments were delivered on time.

   Suggested Watermark: `Printed by %user% at %date% on printer %printer%`

3. **Tracking an Organization's Physical Documents.** Add a sequentially allocated number to every document printed. This number is a document-level Bates number (http://en.wikipedia.org/wiki/Bates_numbering). It is recorded in the Print-Limit Pro database and is useful for organizing document trails.

   Suggested Watermark: `Document No.: %bates% composed of %pages% pages`

4. **Identification and Source Tracking.** Add a unique and secure digital signature to each document. This can be used to verify the origin and generation details of a document. (Note: see Digital Signatures in Detail section below if security is required).

   Suggested Watermark: `%signature%`

5. **Protecting Value of Documents.** The copy protection aspects of watermark signatures described above can be used to protect valuable documents where royalties apply.

   Suggested Watermark: `Copyright ABC Corporation. All rights reserved. Document Signature: %signature%`

6. **Behavioral Change.** The cost of each print job is added to the bottom of each page. This gives the user immediate feedback on the cost of their printing.

   Suggested Watermark: `The cost of this print job is: %cost%`

Tip

To configure watermarking based on the user (e.g. a user's group membership) or job attributes, consider the Advanced Scripting feature. Advanced Scripting allows the watermarking to be enabled/disabled and the watermarking text to be adjusted to meet any need. See Chapter 16, *Advanced Scripting (Print Scripting)* for more details.

7.13.2. Requirements

Watermarking is currently available for printers using PostScript and PCL drivers. You should ensure that the printer driver uses the PostScript or PCL language rather than GDI or other languages. This can be verified by observing the word `Postscript`, `PCL5` or `PCL6` in the Job Log as shown in the screenshot below.

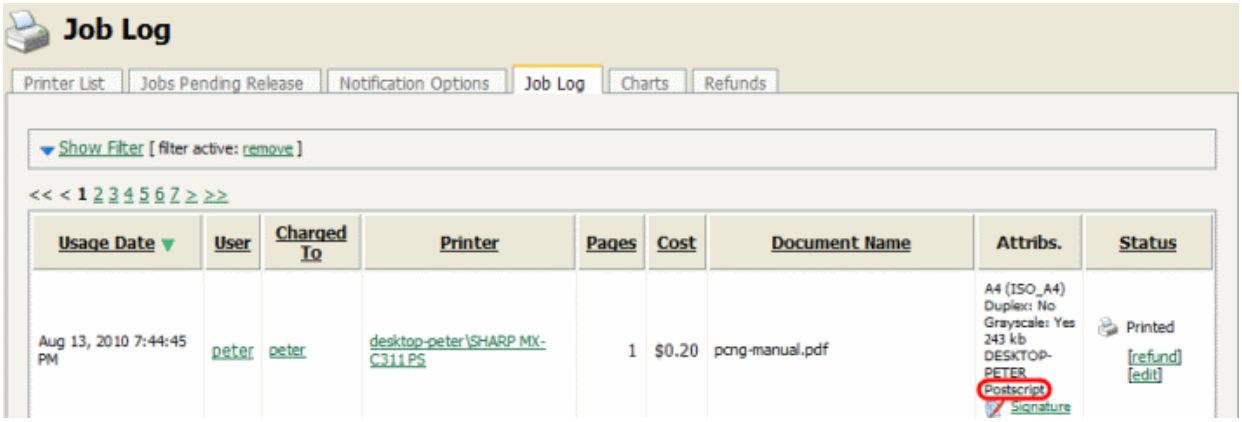


Figure 7.21. Print Job Log showing the PostScript metadata

On Windows systems, if the language lists as EMF then you will need to turn off "Advanced Printing Features" as described in Section 7.13.5, “Troubleshooting”.

7.13.3. Enabling Watermarking

Watermarking is enabled in a printer’s **Printer Details** → **Advanced Configuration**settings via the options **Apply watermarks to all pages**.

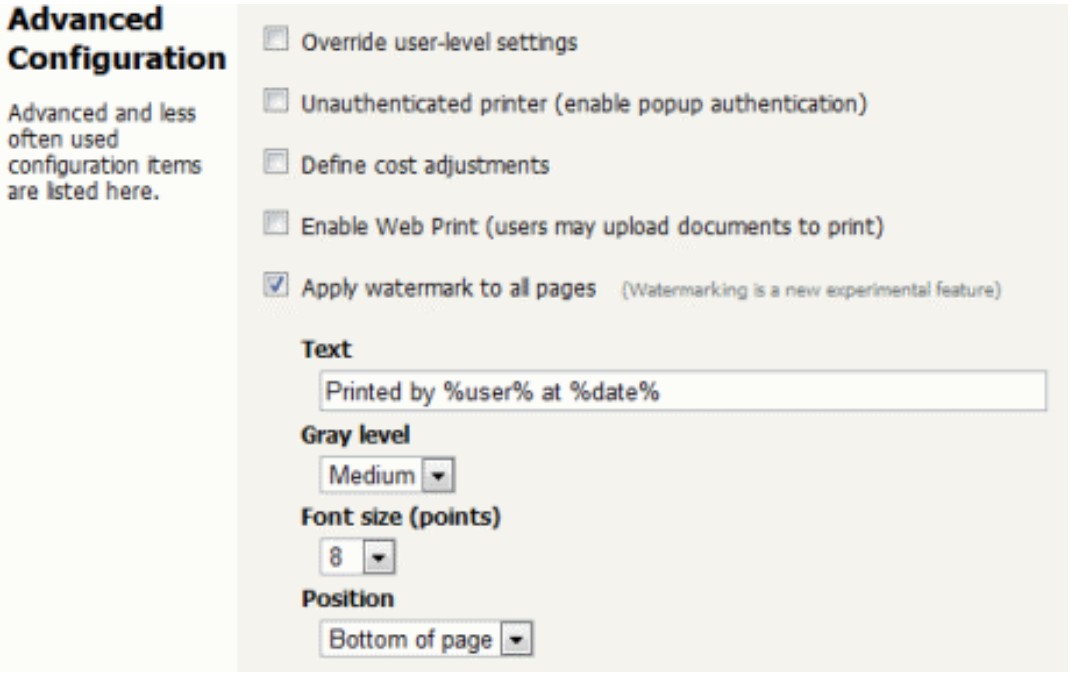


Figure 7.22. Enabling watermarking in the Admin Console

7.13.3.1. Options

Text is the text that will be printed on the watermark. It is possible to use macro substitution variables such as `%user%` and `%date%`. Substitution variables are described in the Substitution Variables/Macros section below.

Gray level determines how dark or light the text will appear. Medium is the default. Light should be just viewable.

Font size determines the watermark text size.

Position can be bottom left of page, top left of page, or custom. Custom is intended for advanced situations where some tweaking is required due to differences in page printable area. Custom positions are specified as the distance from the left of the page and distance from the bottom of the page in millimeters.

7.13.3.2. Substitution Variables/Macros

Field	Description
`%user%`	The name (username) of the user that printed the document.
`%user_id%`	The user's ID code.
`%user_full_name%`	The full name of the user that printed the document.
`%user_email%`	The email address of the user that printed the document.
`%date%`	The date/time that the document was printed. The date is formatted in according the locale of the server. An example of a `%date%` is `12/12/2010 3:12:37 PM`.
`%document%`	The name of the document that printed.
`%server%`	The server name that is hosting the printer that printed the print job.
`%printer%`	The name of the printer where the print job was printed.
`%client_ip%`	The IP address of the workstation the job was sent from.

Field	Description
%client_machine%	The name of the workstation that sent the print job.
%job_id%	The Print-Limit Pro job id of the job.
%copies%	The number of copies of the document that was printed.
%cost%	The cost of the print job.
%pages%	The total number of pages in the print job.
%bates%	A sequentially incrementing number based on a Bates Numbering (http://en.wikipedia.org/wiki/Bates_numbering) scheme. All pages in the document are stamped with the same number. The number is recorded as a signature in the print log.
%signature%	A unique secure digital signature (in text form) generated via an MD5 HMAC. The signature is recorded in the print log. See Digital Signatures in Detail (Advanced) below for technical details.
%digest%	A unique digital signature (in text form) generated using an MD5 of various document attributes.
%sig_md5%	Same as %signature%.
%digest_md5%	Same as %digest%.
%sig_sha1%	Same as %signature% but based on the SHA1 message digest algorithm.
%digest_sha1%	Same as %digest% but based on the SHA1 message digest algorithm.

Table 7.3. Substitution Variables/Macros

7.13.3.3. Restrictions and Limitations

To ensure a document that has a unique single signature, only one digital signature macro should be used in a watermark. The digital signature macros are:

- %bates%
- %signature%
- %sig_md5%
- %sig_sha1%

7.13.4. Digital Signatures in Detail (Advanced)

7.13.4.1. Signature Algorithm

Print-Limit Pro document digital signatures are generated using a cryptographic technique called an HMAC (http://en.wikipedia.org/wiki/HMAC). This works by taking various print job attributes such as print time, username, printer name and document name and combining them with a secret key. The result is then passed through a digest algorithm such as MD5. The resulting signature is unique to the document. The secret key portioning ensures that it is not possible to predict a signature. Two message digest algorithms are available: MD5 And SHA1. In our opinion MD5 will be secure enough for print job signature applications, however for cryptographic completeness SHA1 is provided as an option. Using MD5 makes it easier to enter keys to find matching print jobs because the signatures are shorter.

> **Note**
>
> The algorithm used is:
>
> • Digest = Hash(date time || username || server name || printer name ||

```
   document name || event id)
```

- `Signature = Hash(Digest || Key)`

where

- `key` is a random string generated on first use and stored in the config key "print.signature.hmac-key" and hash is either MD5 or SHA1.
- `date time` is formatted in ISO 8601 basic format from year to second ("yyyyMMddTHHmmss"). The time is local time (not UTC). E.g. "20100130T141059"

7.13.4.2. Verifying a Signature

If a document is located, say due to an information leak, the signature can be used to track down the print event details such as the originating user, time of print, and other details. This is done as follows:

1. Printers -> Job Log
2. Expand the filter section
3. Enter the signature in the **signature** signature field.
4. Press **Apply**. The matching job should list.

For example, the following screenshot shows how to search for the print job with signature `b608c7a39f08643768051217f2f5315a` in the job log.

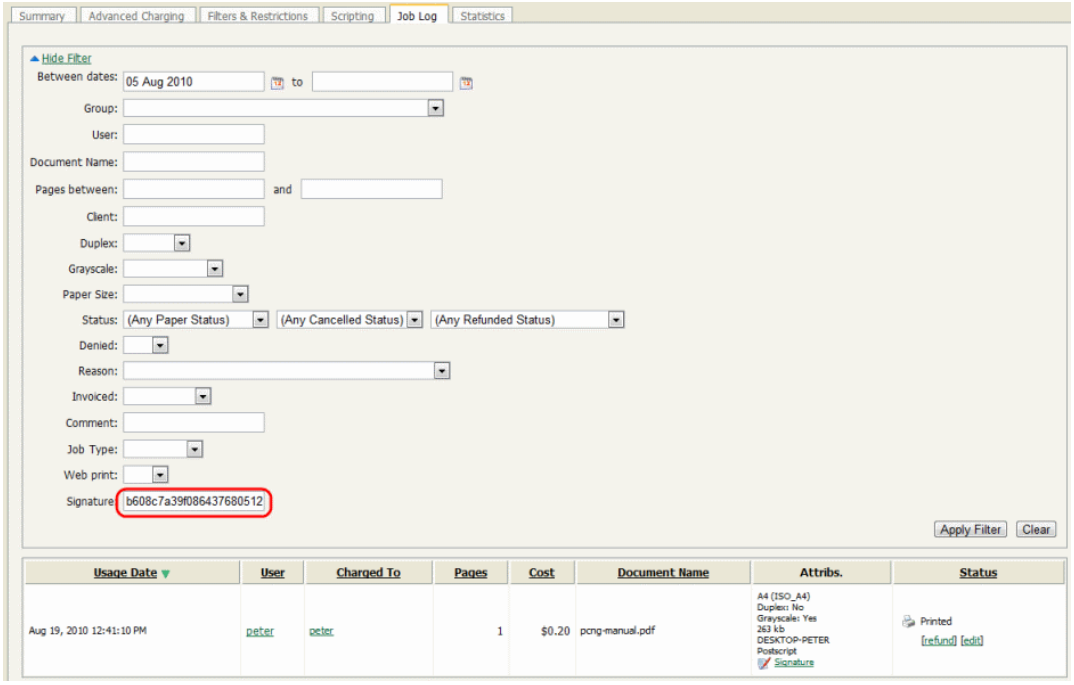


Figure 7.23. Searching job log for signature `b608c7a39f08643768051217f2f5315a`

7.13.5. Troubleshooting

Watermarking requires print jobs to be printed in PostScript or PCL format. If your document is printed in EMF you may be able to print in PostScript or PCL by following the procedure listed in the EMF section below. For all other

drivers please see Section 7.13.5.2, “Other Printer Languages”.

7.13.5.1. EMF

On Windows systems, if the printer language for a job lists as EMF then you will need to turn off "Advanced Printing Features". Disabling this option will cause print jobs to be rendered into their printer language on the client side. Enabling it can result in rendering on the server side, which is usually unwanted.

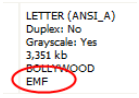


Figure 7.24. Job Log showing an EMF job

You can do this by following these steps:

1. On the **print server**, navigate to: **Start** → **Control Panel** → **Printers** → **[right-click printer]** → **Properties** → **Advanced**
2. Turn **off** (disable) the option **Enable advanced printing features**.
3. Test printing and check the printer language to ensure that it is now PostScript or PCL.

You can read more about this setting on the Microsoft website at: http://support.microsoft.com/?kbid=268093.

7.13.5.2. Other Printer Languages

If the printer language for a job is listed as a non-supported language such as ESC/P2(Epson) then watermarking will not work. The manufacturer may also support other languages such as Postscript as an option. Please check the printer manufacturer's website download page for details.

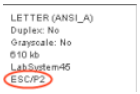


Figure 7.25. Job Log showing a ESC/P2(Epson) job

7.13.5.3. Updating Printer Drivers

When updating printer drivers, it is important to update the printer drivers on **both the client and the server**.

7.14. Behavior on Server Connection Failures

There are various scenarios where the users want to print their print jobs but the Print-Limit Application Server is unable to receive the information about the printing, including when:

- The Application Server's machine is being rebooted,
- The network link is down between a Secondary Print Server on a remote machine and the Application Server,
- The administrator has decided to shutdown the Application Server for maintenance.

When this occurs Print-Limit must decide on how to handle the print job without communicating with the Application Server. The administrator can configure Print-Limit to handle new jobs in 3 ways:

1. Allow new print jobs to print but do not log (default),
2. Allow new print jobs to print and log after reconnection,
3. Do not allow new print jobs to print but hold and wait for reconnection.

Each of these options offer different compromises, and the best option will depend on the needs and priorities of a

particular installation. For example, if it's important to never interrupt printing then options 1 or 2 can be selected. If it's important to strictly enforce quotas (i.e. allow the job to be cancelled if they do not have enough quota) and it is acceptable to delay printing until the connection is reestablished then option 3 can be chosen. These options are discussed in further detail below.

These configuration options are controlled under the **Printers+[select printer]** → **Failure Mode**.

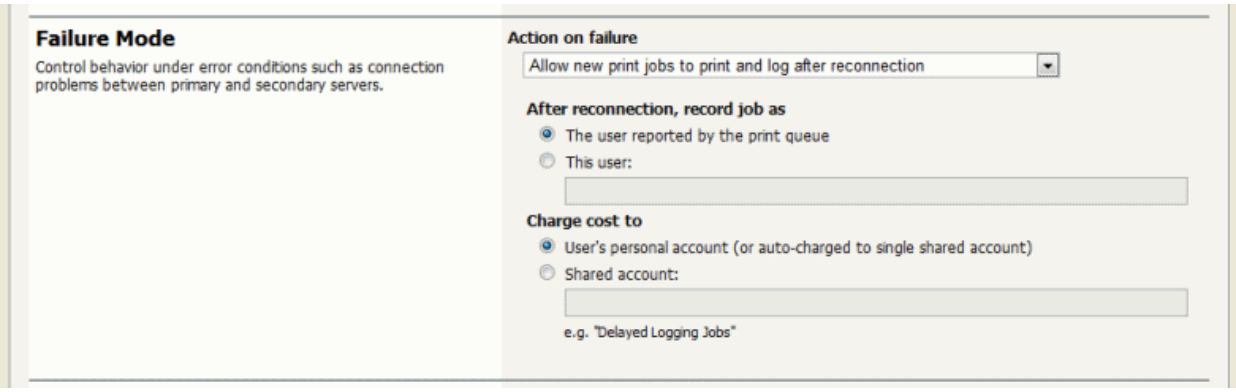

Failure Mode
Control behavior under error conditions such as connection problems between primary and secondary servers.
Action on failure
Allow new print jobs to print and log after reconnection
After reconnection, record job as
The user reported by the print queue
This user:
Charge cost to
User's personal account (or auto-charged to single shared account)
Shared account:
e.g. "Delayed Logging Jobs"

Figure 7.26. Failure mode settings

7.14.1. Failure Mode Settings

7.14.1.1. Mode 1: Allow new jobs to print but do not log

This is the default mode and will allow jobs to print when the connection to the server is down (a "fail open" mode). The jobs printed during this period will not be logged in the Application Server. This mode can be used when:

- It is important to not interrupt printing when outages occur,
- The setup needs to be simple and easy to understand,
- It is not important to log jobs printed during failures,
- Strict quota enforcement is not required, Users will not be charged for printing that occurred during the outage.

7.14.1.2. Mode 2: Allow new jobs to print and log after reconnection

This mode allows jobs to print when the connection to the primary server is down, but when the connection is re-established these jobs are re-sent to the Application Server and logged (a "fail open" mode with re-send/offline mode). This mode can be used when:

- It is important to not interrupt printing when outages occur,
- It is important to log/charge every job printed during failures,
- Strict quota enforcement is less important. Users may end up using more credit than they have available.

In this failure mode the administrator can configure how these resent jobs are recorded in the job log:

1. Leave the job information unchanged (i.e. log the job against the user that printed it),
2. Change the recorded user to another nominated user,
3. Change the charging of the print job to a nominated shared account.

The default reconnection option is 1, where we log and charge the same way we would if the recording was done live. The administrator may consider this unfair to charge the user during this failure time (as there were no warning popups or ways of telling that the user's quota was reaching its limit). It may be more reasonable to use the

reconnection options of 2 or 3. With option 2, the administrator can choose a new user such as "AppServerDown" to record the job as and in this way completely divorce the user from jobs printed during the failure.

If the administrator would still like to track who did the printing but just thinks it is unfair to charge their personal account, then reconnection option 3 can be chosen, and a new shared account such as "AppServerDown", or an account corresponding to the department owning the printer can be charged. Jobs are still recorded under the user's name.

When the connection to the Application Server opens up again, the print jobs will show up in the Application Server's job log within a few minutes. They will show up with a special status and icon in the job log (see figure below).

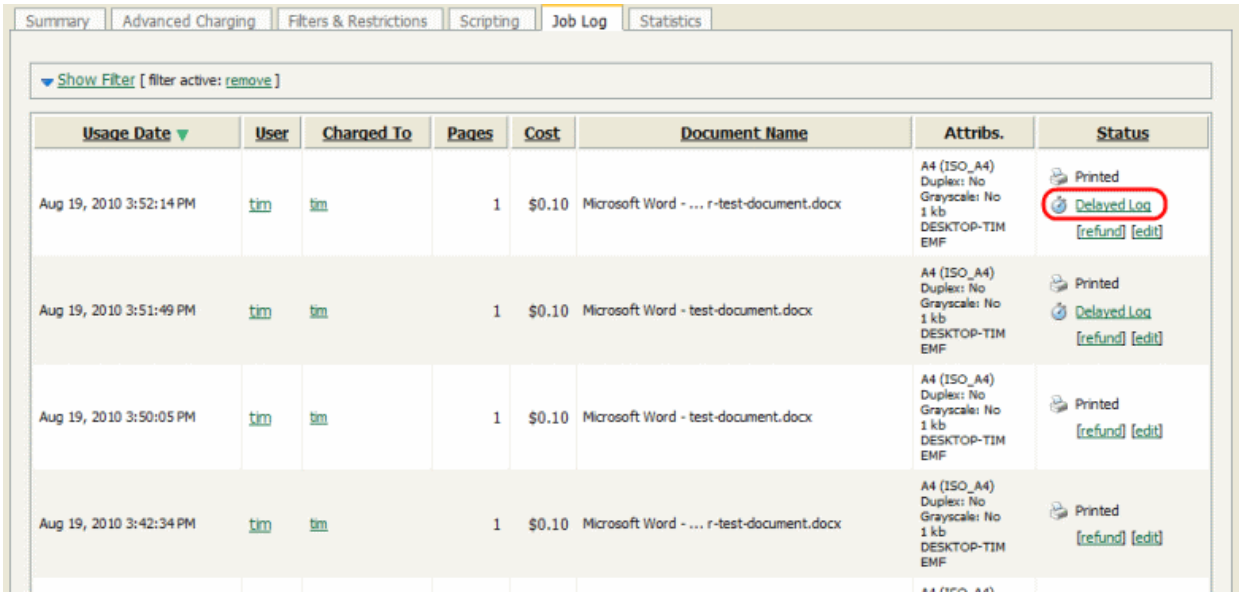


Figure 7.27. Status of print jobs logged after reconnection

7.14.1.3. Mode 3: Do not allow new print jobs to print but hold and wait for reconnection

In this mode all jobs will be held in the queue while the connection to the server is down (a "fail closed" mode). Once the connection to the server is reestablished the jobs will be sent to the server and printing will be processed as normal. This mode can be used when:

- Strict quota enforcement is required,
- Secure Print Release or Find-me printing is used and jobs must not be printed until released by a user.

7.15. Toner Levels (for supported printers)

Managing printer toner on a large fleet of printers can be a time-consuming task. The administrator must track toner usage and ensure that replacement toner cartridges are available when printer toner runs out. Often the administrator is only made aware that a printer is out of toner after receiving complaints from users. Print-Limit Pro can track the toner levels for supported printers and provide toner level information in reports or email notifications when the toner is low.

Armed with this information the administrator can purchase toner supplies in advance and replace toner cartridges before the printer runs out of toner. This saves the administrator time and ensures that printer downtime is minimized.

For more information on low toner notifications see Section 12.6.2.2, “Printer low toner notifications”.

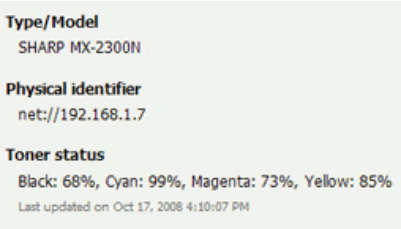


Figure 7.28. Toner level information on Printer Details screen

7.15.1. How toner level information is retrieved?

Print-Limit Pro retrieves toner information from supported printers using the SNMP network protocol. Most modern network printers allow the toner information be queried via SNMP. Print-Limit Pro can retrieve toner information for printers that meet the following requirements:

- The printer is networked (i.e. it is connected to your network and not directly to a computer with a USB or parallel port).
- The printer supports SNMP and it is enabled.
- The printer supports the SNMP standard for printers (RFC 1759) that allows toner information to be retrieved in a standardized way. Most network printers support this standard.
- The Print-Limit Pro server can establish SNMP connections to the printer. Ensure that your network (e.g. routers, firewalls, etc) allow SNMP connections between the Print-Limit Pro server and your printers.

Print-Limit Pro regularly updates the toner information to ensure the data is kept up-to-date.

A report with 'Toner Status', 'Lowest Toner Value' and 'Toner Last Updated on' fields can be generated from the Admin Console. Select the Printers tab to open the Printer List. At the bottom of the list select Export / Print in Excel format.

7.16. Printer Quick Reference

How do I view printing history?

Printing history can be quickly accessed via a number of areas. The most appropriate area depends on the information required.

- To view a user's printing history select the **Job Log** under the user's details page.
- To view recent print jobs printed on a printer, select **Job Log** under the appropriate printer's details page.
- To view all print jobs printed on the network with advanced search and filtering options, use the global Print Log under the Printers section.

How do I add a new printer?

On Windows systems, new printers will be added to the system automatically once the printer is added to a monitored server. On a Mac or Linux system, after Print-Limit Pro is enabled on the printer, it will list in the administration interface after first print. New printers are assigned initial settings based on the configuration assigned to the `[Template Printer]`.

How do I delete a printer?

Once the printer has been removed from the operating system's print list, the printer may be deleted from Print-Limit Pro via the delete printer action under the printer's detail page. This action will remove the printer from the monitored list. Print history logs are still maintained allowing access to historical data. Always confirm your action before proceeding with the delete!

How do I disable a printer?

Printers can be disabled indefinitely or for a specified time via the **Disable** option under the printer's details section.

How do I tell Print-Limit Pro to ignore (not monitor) a printer?

By default on Windows systems all printers are tracked by Print-Limit Pro. The *Print Provider* can be instructed to ignore a printer by setting the `IgnorePrinters=` attribute in the `print-provider.conf` file. A restart may be required for this to take effect. Note: This setting only stops monitoring. The printer will continue to be listed under the printer list section until it is manually deleted via the **Delete printer** action.

For more information see Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

What can I use the printer notes field for?

The **Notes** field under each printer is useful for tracking all manner of information. Typical uses include:

- Tracking configuration changes
- Recording maintenance and/or toner replacements
- Documenting problems
- Leaving notes/comments to assist other administrators.

7.17. Refunding Print Jobs

Paper jams, toner problems and print quality issues will always occur. Larger organizations will require a policy to address these situations and under what conditions a print job may be refunded. The assessment to give a refund or not is subjective and needs to be managed by responsible administrators. To streamline and partially automate the process Print-Limit Pro provides a browser based refund management process.

Highlights include:

- Users can request refunds via a simple form and track their status.
- Administrators can quickly approve/deny requests with one click.
- Administrators can be alerted via email when requests are pending.
- Issue partial and manual refunds.

7.17.1. Enabling End-User Refunds

Users request refunds via the end user web pages. This feature is enabled as follows:

1. Log into Print-Limit Pro admin interface.
2. Navigate to **Options** → **General**.
3. Under **User Features**, enable the option **Allow users to request refunds**.

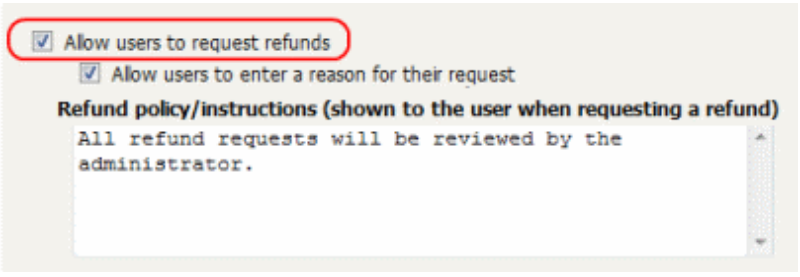

Allow users to request refunds
Allow users to enter a reason for their request
Refund policy/instructions (shown to the user when requesting a refund)
All refund requests will be reviewed by the administrator.

Figure 7.29. Enabling end-user print job refund requests

4. Click **Apply**.

End-users may enter a reason why they are requesting a refund. Some organizations may prefer to disable this feature, e.g. where users may write inappropriate comments. To disable end-user comments/reasons, deselect the **Allow users to enter a reason for their request** checkbox.

It is recommended that organizations follow a formal refund policy. This policy may be outlined via **Refund policy/instructions** option. This text may also include basic HTML markup such as a link to an external policy page.

7.17.2. Managing Refunds

The refund process is best described in the form of an example.

7.17.2.1. How users request refunds

John's print job failed to fully print due to a printer jam, forcing him to reprint the remainder of the job on another printer. He would like to request a refund of approx. 50% of his job cost for the first failed job. John would place the request as follows:

1. Log in to the user web interface at `http://[server_name]:9191/user` using his network username and password.
2. Locate the first, failed print job on the **Recent Print Jobs** page.
3. Click the **[Request Refund]** link.

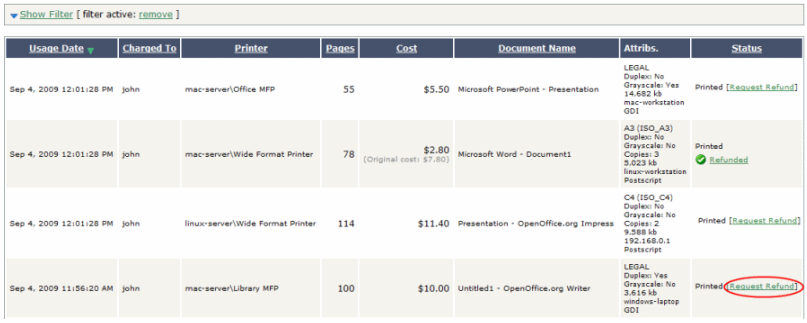


Figure 7.30. A [Request Refund] link on the Recent Print Jobs

4. Enter a reason.

Figure 7.31. Sending refund request

5. Click **Send**.

7.17.2.2. The administrator approval process

Jenny is an IT administrator at John's school. She has just received an email indicating that refund requests are pending review. To approve John's request Jenny would:

1. Log into Print-Limit Pro admin interface.
2. Navigate to **Printers** → **Refunds**.
3. Locate John's request and review.
4. Click the **Approve** link.

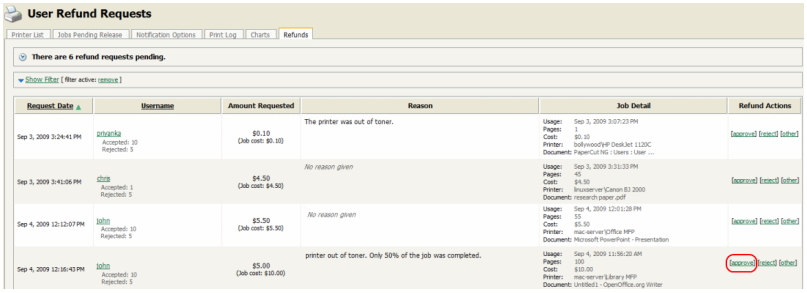


Figure 7.32. Approving a refund request from the Refunds tab in the admin interface.

Jenny could have denied the refund request by clicking on **[reject]** link. Clicking the **[other]** option would have allowed Jenny to review John's previous requests for refunds, edit the requested amount and write a comment.

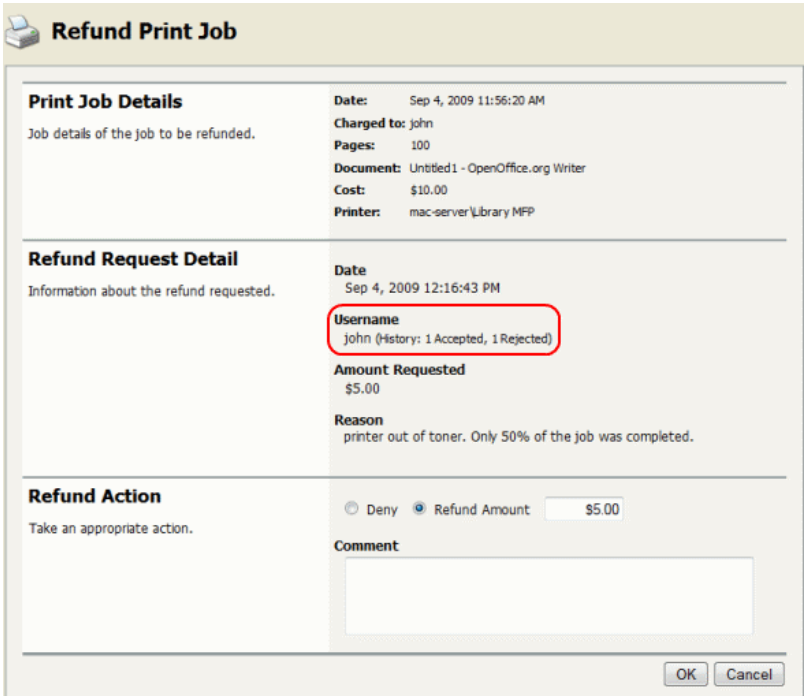


Figure 7.33. Overview of user's refund request

7.17.3. Admin Notifications

Administrators may receive regular emails about pending refund requests. Email notifications can be enabled via **Options** → **Notifications** → **System Notifications** → **Notify when there are pending refund requests**. More information is available in Section 12.6.2.4, “Pending refund request notifications”.

Emails may be delivered hourly or daily. By default daily messages are delivered at 7 a.m. This hour of day can be configured via the config key `notify.pending-refund-requests.daily-hour-of-day`. See Section 12.9, “Using the Config Editor” for information about changing config keys.

7.17.4. User Notifications

Users may receive an email notification when their refund request has been actioned by an administrator. To enable this feature:

- Enable the option at **Options** → **General** → **User Features** → **Allow users to request refunds** → **Email user when their request is processed**.
- An SMTP server must have been defined so that emails can be sent (see Section 12.6.1.3, “Configuring Email Notifications”).
- Either the user must have an email address defined, or the *email suffix* must be enabled.

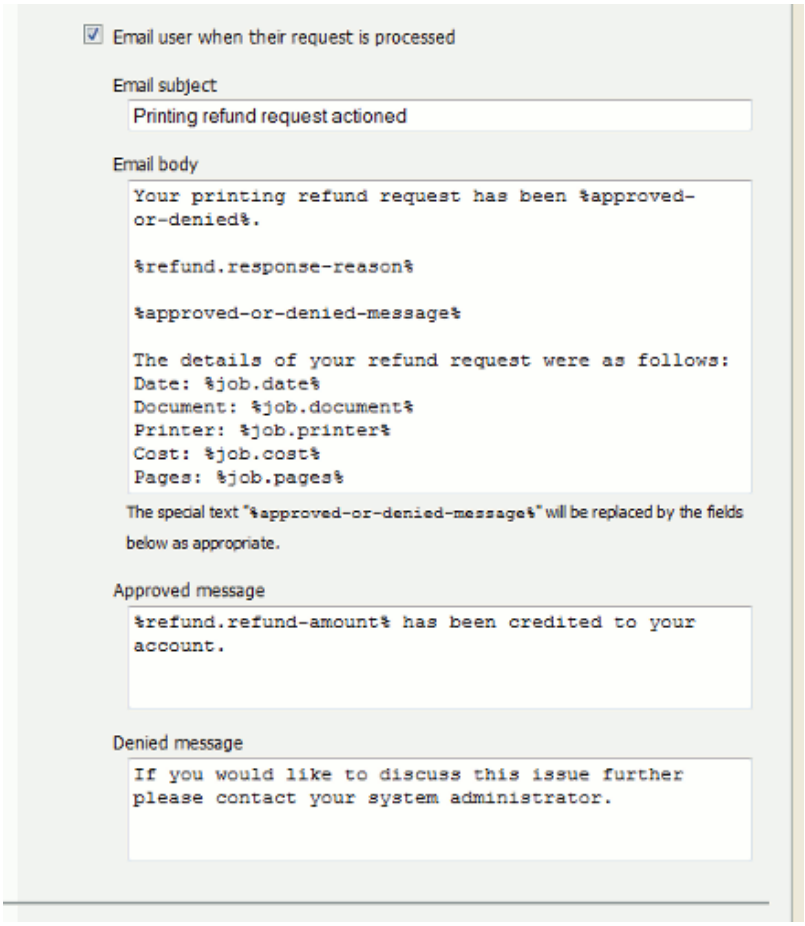

Email user when their request is processed
Email subject
Printing refund request actioned
Email body
Your printing refund request has been %approved-or-denied%.
%refund.response-reason%
%approved-or-denied-message%
The details of your refund request were as follows:
Date: %job.date%
Document: %job.document%
Printer: %job.printer%
Cost: %job.cost%
Pages: %job.pages%
The special text "%approved-or-denied-message%" will be replaced by the fields below as appropriate.
Approved message
%refund.refund-amount% has been credited to your account.
Denied message
If you would like to discuss this issue further please contact your system administrator.

Figure 7.34. Printer refund request user notification options

The **Email subject** and **Email body** options make up the subject and body of the email that is sent to the user. The **Approved message** and **Denied message** options are used for the replacement marker `%approved-or-denied-message%` in the email body.

Other than the `%approved-or-denied-message%` marker, the following markers can be used in any of the above four fields:

Field	Description
%job.copies%	The number of copies in the print job.
%job.cost%	The original cost of the print job.
%job.date%	The date the original print job was sent.
%job.document%	The document name of the print job.
%job.pages%	The number of pages in the print job.
%job.paper-size%	The paper size of the print job.
%job.printer%	The printer the print job was sent to.
%refund.refund-amount%	The amount that was refunded.
%refund.request-amount%	The refund amount requested by the user.

Field	Description
%refund.request-date%	The date the user made the refund request.
%refund.request-reason%	The reason the user gave for the refund request.
%refund.request-username%	The username of the user making the refund request.
%refund.response-date%	The date the refund was actioned.
%refund.response-reason%	The reason the admin user gave for approving/denying the refund request.
%refund.response-username%	The username of the administrator who actioned the refund request.
%refund.status%	The status of the refund request as it appears in the **Job Log**.

Table 7.4. Fields available printer refund request user notifications

7.18. Custom Printer Fields

To assist with device management, custom fields may be enabled on printers. Custom fields can be assigned user-defined names and can represent any data you would find useful for printer management in your organization. Common examples include recording metadata such as, asset number, lease period, device status, date of acquisition, last maintenance date, department ownership, etc.

Up to six custom fields may be defined. The names are set by the administrator as per the site requirement. In turn, these custom fields may be used for many purposes such as recording data, filtering lists, and creating/exporting reports.

7.18.1. Defining Custom Printer Fields

To define a custom printer field(s):

1. Log into the Print-Limit Pro admin interface.
2. Navigate to **Options** → **General**.
3. Under **Printer Options**, select **Enable custom printer fields**.

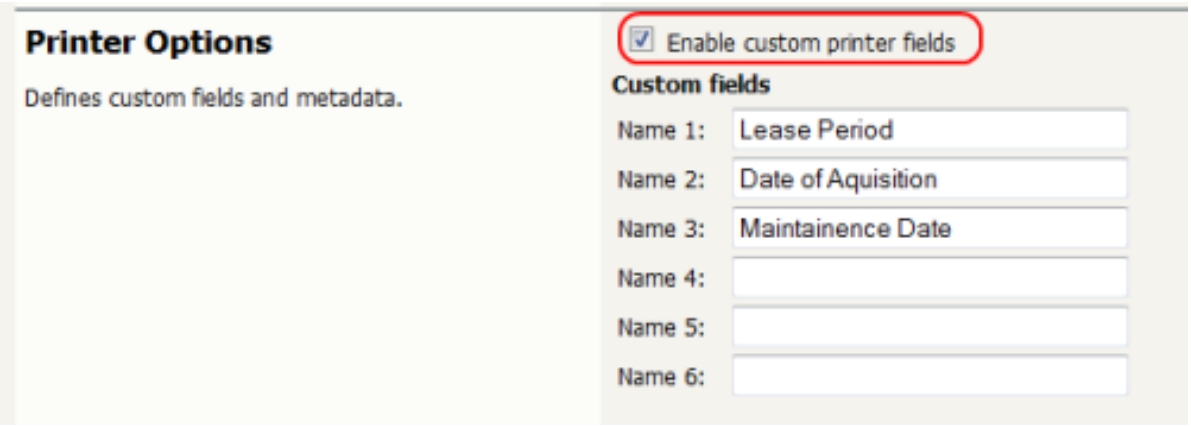


Figure 7.35. Defining custom printer fields

4. Enter an appropriate name for `Name 1` and repeat for any other fields that you plan to use.
5. Click **Apply**.

Once enabled, the custom fields will be visible in the **Printer Details** page.

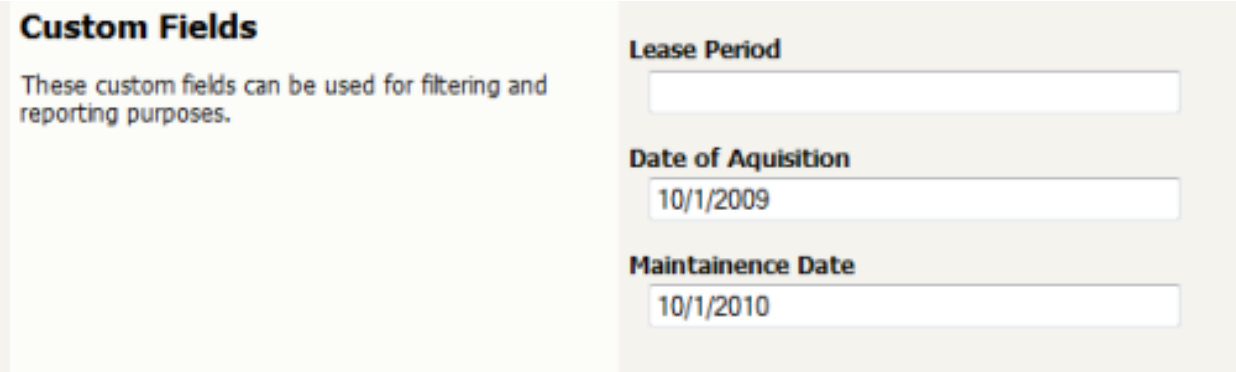


Figure 7.36. Custom printer fields

The custom field may also be used in other areas of the application such as filtering the printer list, and applying ad-hoc reporting conditions.

Chapter 8. Shared Accounts

Print-Limit Pro has two types of accounts - personal accounts and shared accounts. Each user has a personal account. This is the default account charged under normal operation. In some organizations and businesses it may be useful to provide users, or selected users with the option to charge printing to a shared account. Some uses of shared accounts include ...

In business:

- Allocate and budget printing by business areas (e.g. cost center)
- Track printing by project, phase, client or account
- Track printing by client/matter - popular in legal and accounting firms

In a school or university:

- Budget staff use via shared faculty or department accounts
- Provide share accounts for classes or subjects
- Track printing costs by subject areas

Shared account scenario

East Beach High School has implemented Print-Limit Pro to control their printing. Students are allocated a $5.00 a month budget. Pre-paid cards are sold at the library for students who need extra credit above this allowance.

Teachers and staff are given a small personal budget to cover casual printing with curriculum material to be allocated to share accounts. Shared accounts exist for each faculty. The network administrator has granted staff members access to the share account popup. Access to faculty accounts is controlled via Active Directory group membership.

Sarah is a Science and English teacher at the school. When she prints she is able to allocate the print job to either her personal account or either the Science or English shared account via a drop-down list. She can also view the shared accounts balances from the User web pages.

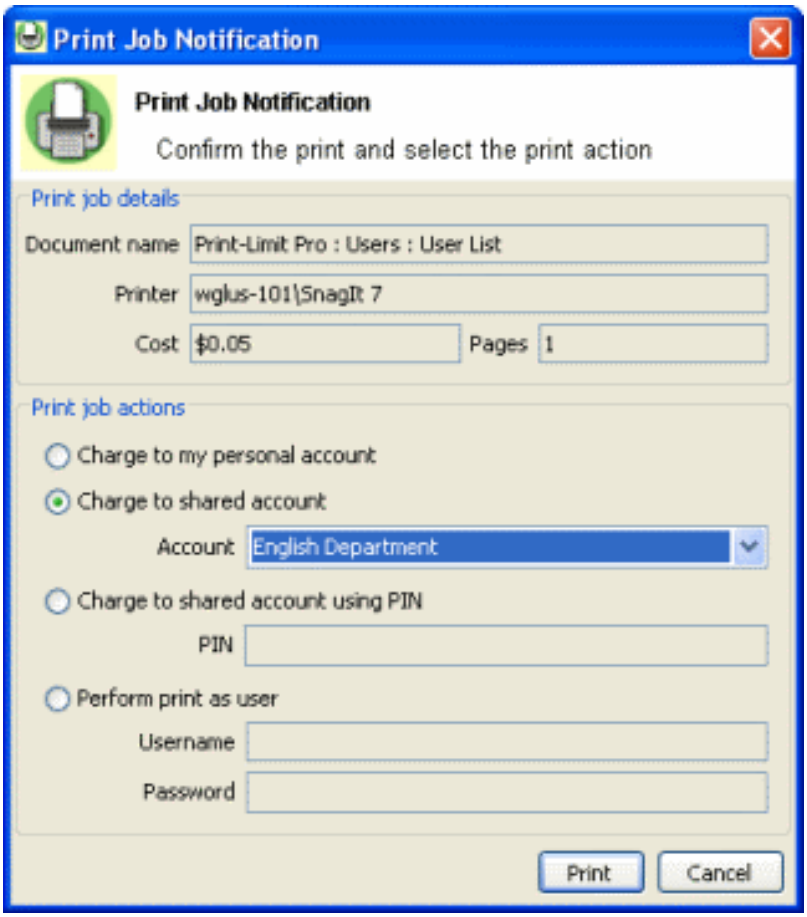


Figure 8.1. Selecting a shared account with the User Client popup

Tip

To educate the users about shared accounts, administrators might find the sample information sheet helpful.

8.1. Creating a Shared Account

Personal user accounts are automatically created when users are first imported into the system. Shared accounts are created manually on an as-need basis. Normally shared accounts are created manually via the administration interface, however organizations with many accounts and good IT skills can automate the account creation process by importing accounts. Import options include via a file (for example Excel, or an export from a 3rd party system) or by scanning an existing directory structure. More information on automatic importing can be found in Section 8.6, “Batch Shared Account Import and Update”.

To create a shared account:

1. Log into Print-Limit Pro as an administrator (e.g. admin account).
2. Select the **Accounts** tab.
3. Click the **Create a new account** action.
4. Enter an appropriate name for the account. Account names should be as descriptive as possible.

5. Complete other details such as starting balance, restrictions status and notes as appropriate.
6. Click the **OK** button to save the changes and return to the accounts list.

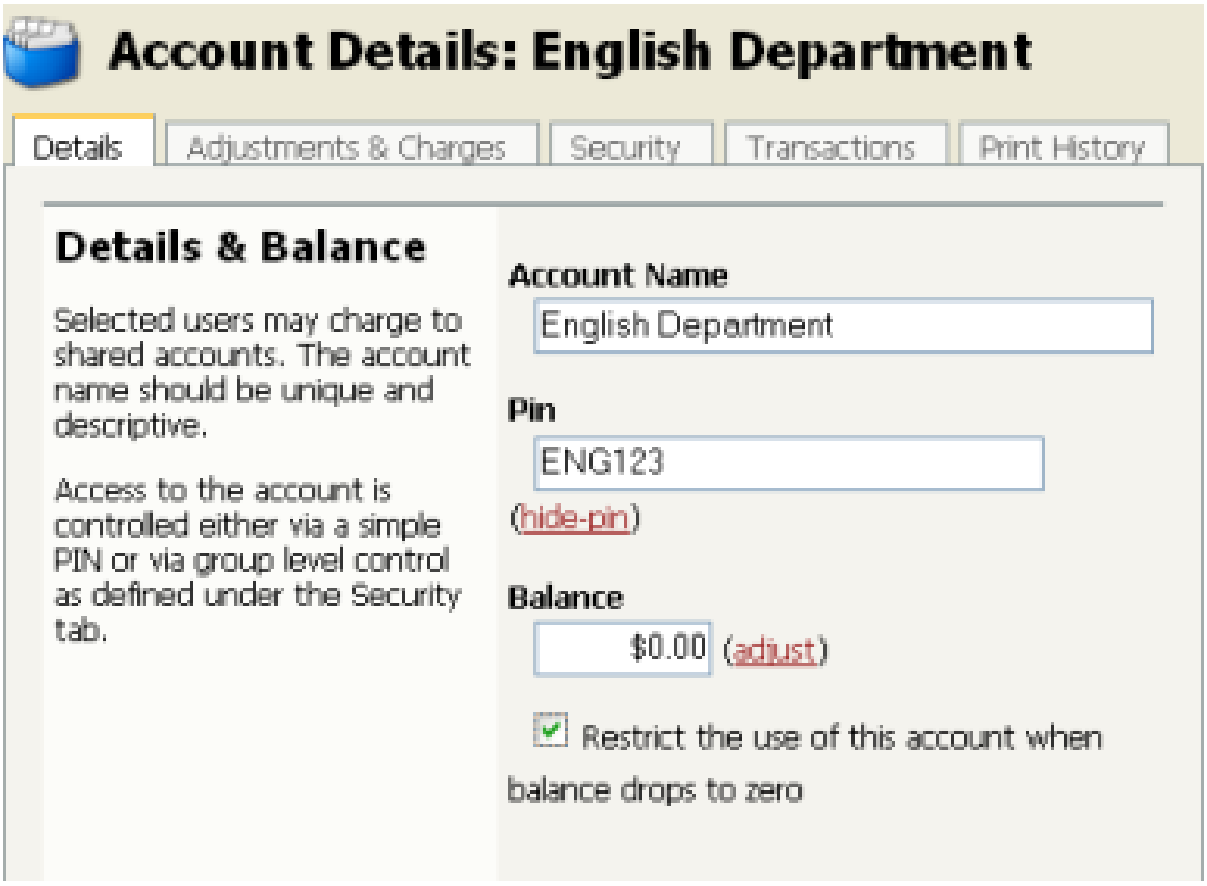

Account Details: English Department
Details
Adjustments & Charges
Security
Transactions
Print History
Details & Balance
Selected users may charge to shared accounts. The account name should be unique and descriptive.
Access to the account is controlled either via a simple PIN or via group level control as defined under the Security tab.
Account Name
English Department
Pin
ENG123
(hide-pin)
Balance
$0.00
(adjust)
Restrict the use of this account when balance drops to zero

Figure 8.2. Creating a shared account

By default shared accounts default to an unrestricted status. This means that the account's balance is allowed to drop below zero. Many organizations use shared account to track printing expense. A common strategy is to start the account off at a zero balance and let it count down into the negative. By setting the account to restricted and allocating an initial starting balance, shared accounts can be used as a budget control system as printing to the account is denied once credit is exhausted.

Tip

Print-Limit Pro has support for advanced parent/child account structures. The subsequent account naming conventions section covers many of the common practices. See Section 8.2, “Account Naming Guidelines” for more details.

Each account can also be assigned a PIN/Code that helps uniquely identify an account. Many users use the codes to represent cost-centers, clients, projects, etc. These codes are often also used in other systems (like the accounting system) to identify these accounts consistently across the organization. Once defined, these codes can be used in the client software to quickly search for accounts, and can also displayed in account-based reports.

The account PIN/code can be entered on both parent and sub-accounts. For example, it is common to use parent accounts to represent clients and sub-accounts to represent projects for those clients. In this scenario, the parent

account code would represent a client code, and the sub-account code would represent the project code.

8.1.1. The Template Account

The `[Template Account]` is designed to save time by applying the most common settings to all newly created accounts. The `[Template Account]` can be found on the **Shared Account List** page of the **Accounts** tab.

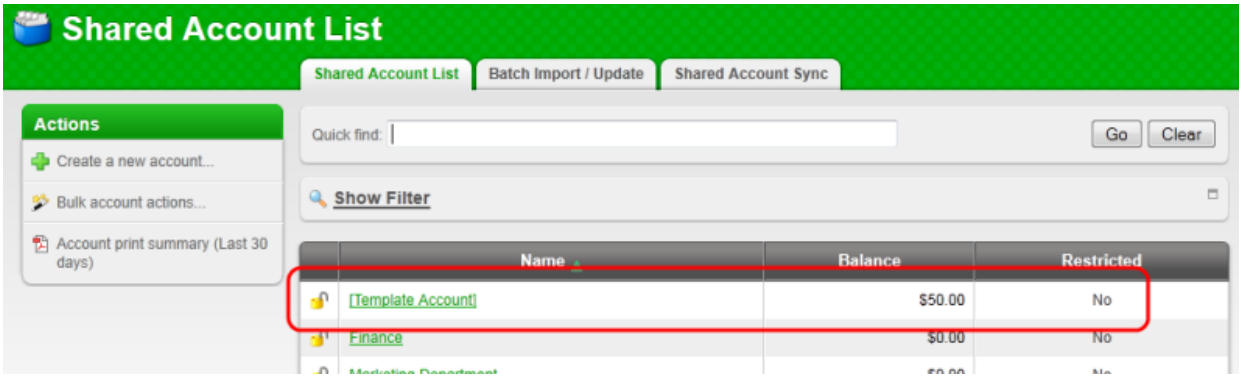


Figure 8.3. The template account

Any settings applied to the template account will be applied to new accounts when they are created.

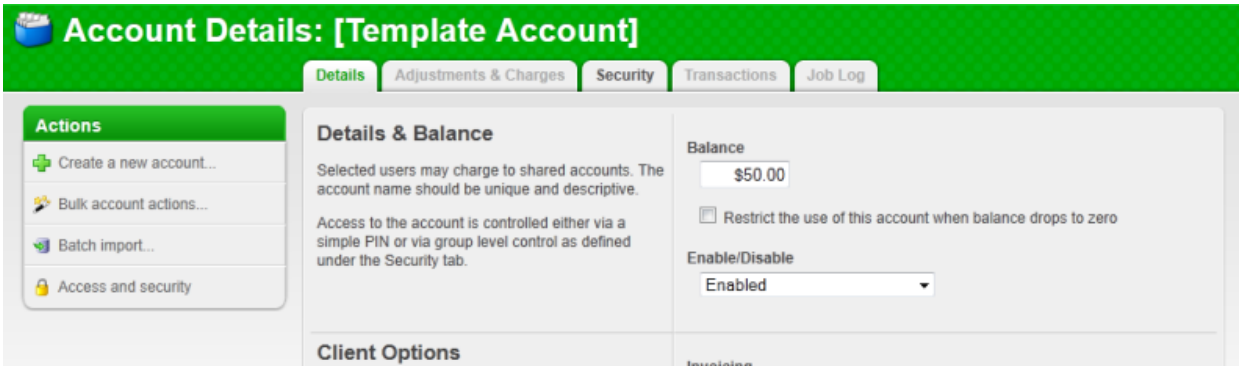

Account Details: [Template Account]
Details
Adjustments & Charges
Security
Transactions
Job Log
Actions
Create a new account...
Bulk account actions...
Batch import...
Access and security
Details & Balance
Selected users may charge to shared accounts. The account name should be unique and descriptive.
Access to the account is controlled either via a simple PIN or via group level control as defined under the Security tab.
Balance
$50.00
Restrict the use of this account when balance drops to zero
Enable/Disable
Enabled
Client Options

Figure 8.4. Template account settings

Some examples of where the template account might prove useful include:

- Applying common security settings. For example, if the `Staff` group should have access to all accounts, adding the group to the template account will ensure group members can also charge to future accounts.
- Applying a starting balance. The starting balance might represent the standard department print quota or the amount of 'free printing' a customer has before they are billed for the excess.

8.2. Account Naming Guidelines

Administrators are encouraged to create accounts as logically related groups. Doing so makes for easier searching and charging, and better integration with existing accounting systems.

Different account models may be adopted by organizations depending on their requirements. Common models are:

- *Faculty or Department* - a simple flat list familiar to schools, colleges and Universities.
- *Client / Matter model* - familiar to legal and accounting firms

- *Project / Phase model* - familiar to engineering and technology firms
- *Customer / Job model* - familiar to other customer based firms and common in accounting software

The following sections describe how to configure Print-Limit Pro to best match the three advanced models.

8.2.1. Client / Matter Naming Model

The client / matter model is one with which legal and accounting firms are familiar. In this model:

- Top level accounts are created for each client
- Sub-accounts are created for each matter under the relevant client

Usually, charging directly to a client (without a matter) is not allowed in this model. Instead users should charge to the relevant matter. System administrators should set each top level account to be inactive (disabled), and all sub-accounts to active, as shown in Figure 8.5, “Client / Matter Naming Model example”. This will enforce use of sub-accounts only.

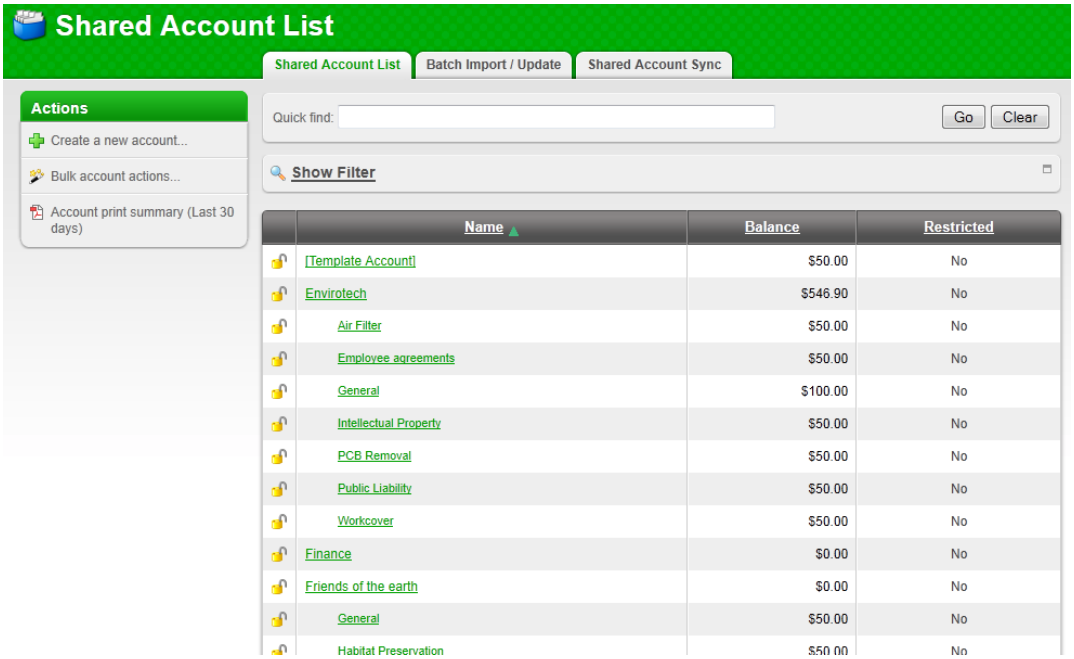


Figure 8.5. Client / Matter Naming Model example

As shown in the example, the shared account *code* is used as the client code for the top level client accounts, and the matter code for the matter sub-accounts. In the account list, the sub-account codes are displayed as `[parentCode]-[subCode]`. For the shared account code to be visible, the option **Make shared account PIN / code visible** must be enabled. For more information see Section 8.11, “Advanced Shared Account Options”.

By including both the client/matter code and name, users are able to search for a particular account by either client code, matter code, client name or matter name. The following examples demonstrate this:

1. Searching by client name will display the client plus all matter codes for the client.

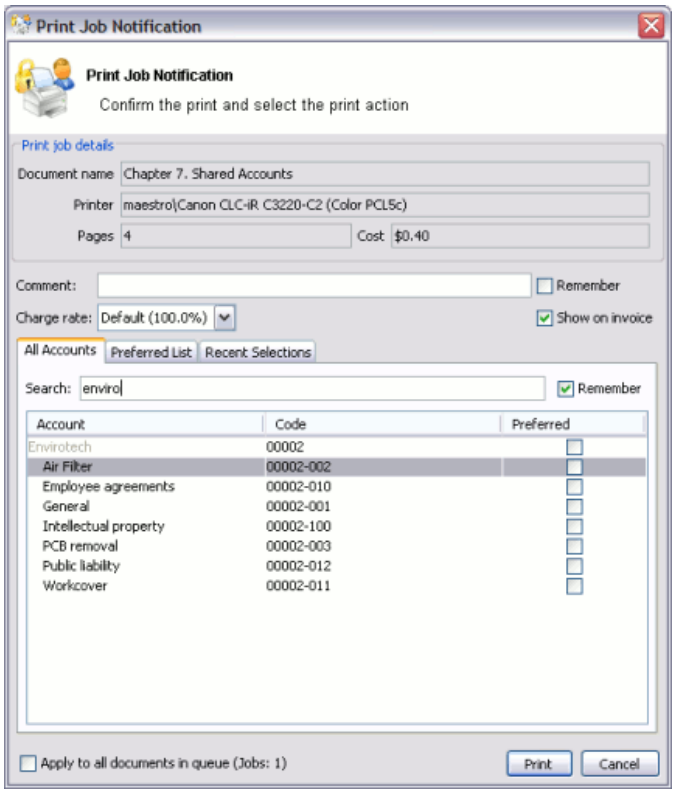


Figure 8.6. Searching accounts by client name in the client/matter code naming model

2. Searching by client code will display the client plus all matter codes for the client.

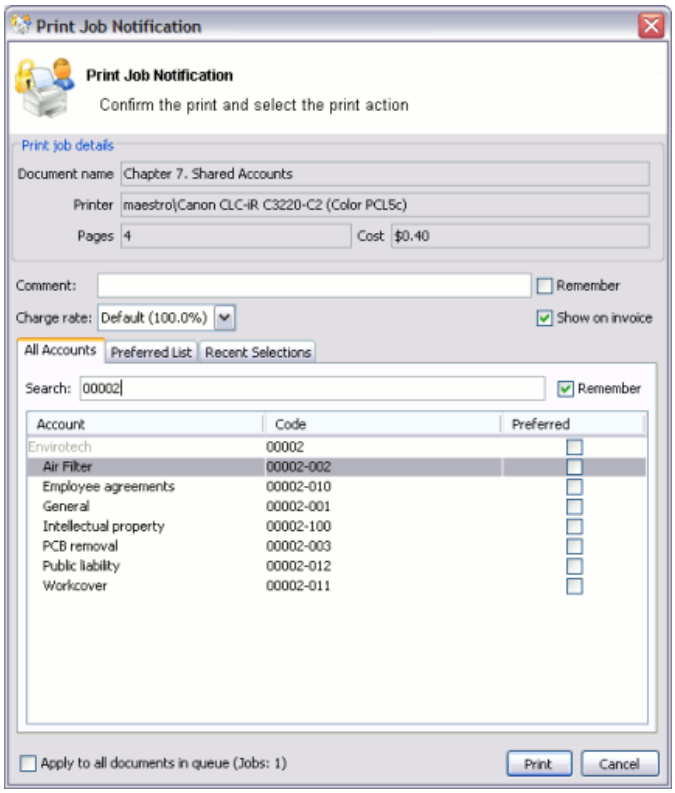


Figure 8.7. Searching accounts by client code in the client/matter code naming model

3. Searching by matter name will display the matching matters plus the client for each matching matter.

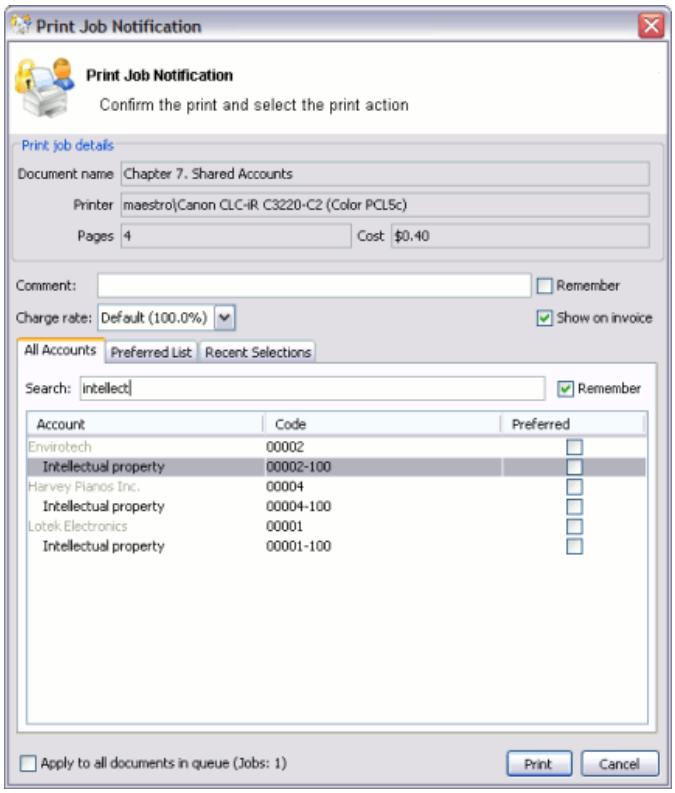


Figure 8.8. Searching accounts by matter name in the client/matter code naming model

4. Searching by matter code will display the matching matters plus the client for each matching matter.

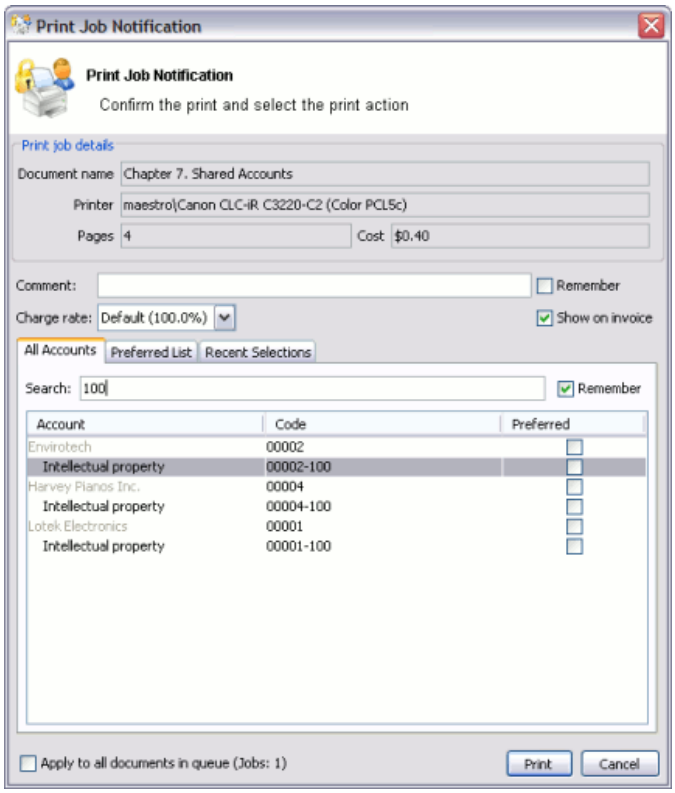


Figure 8.9. Searching accounts by matter code in the client/matter code naming model

8.2.2. Project / Phase Naming Model

Engineering and IT firms will be familiar with the project / phase model:

- Parent accounts are created for each project
- Sub-accounts are created for each project phase or stage

Usually, charging directly to a project is not allowed in this model - instead users should charge to the relevant project phase. System administrators should set each parent account to be inactive (disabled), and all the sub-accounts to be active, as shown in Figure 8.10, “Project / Phase Naming Model example”.

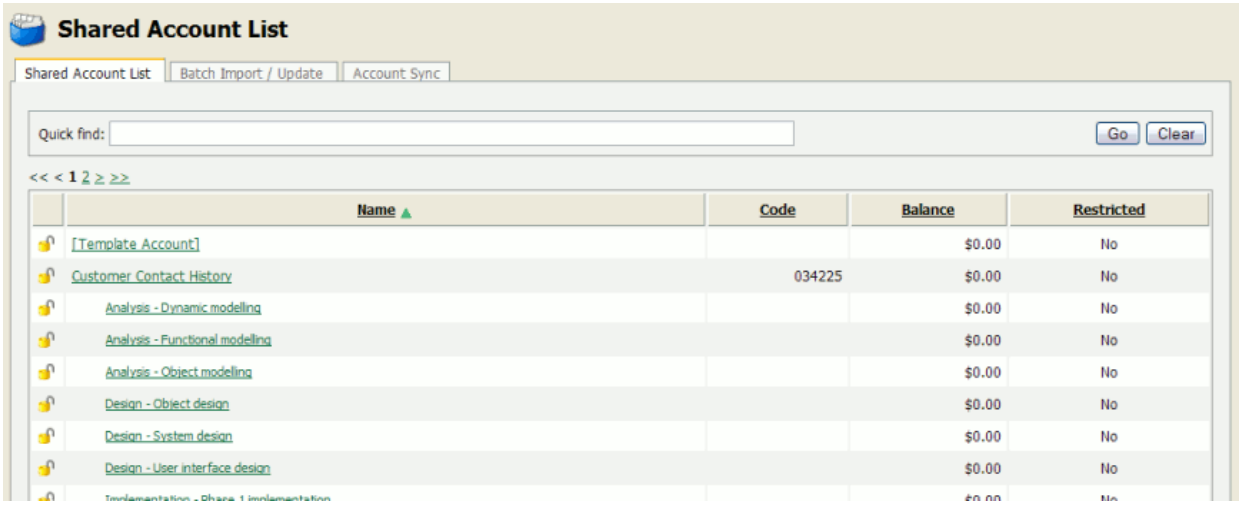


Figure 8.10. Project / Phase Naming Model example

When projects have a job or project number, it is recommended that it be included as the shared account *code*. For the shared account code to be visible, the option **Make shared account PIN / code visible** must be enabled. For more information see Section 8.11, “Advanced Shared Account Options”.

By including the project name, project number and phase name, users can search for a particular account using any of these fields. The following examples demonstrate this:

1. Searching by project name or number will display the project plus all phases for that project.

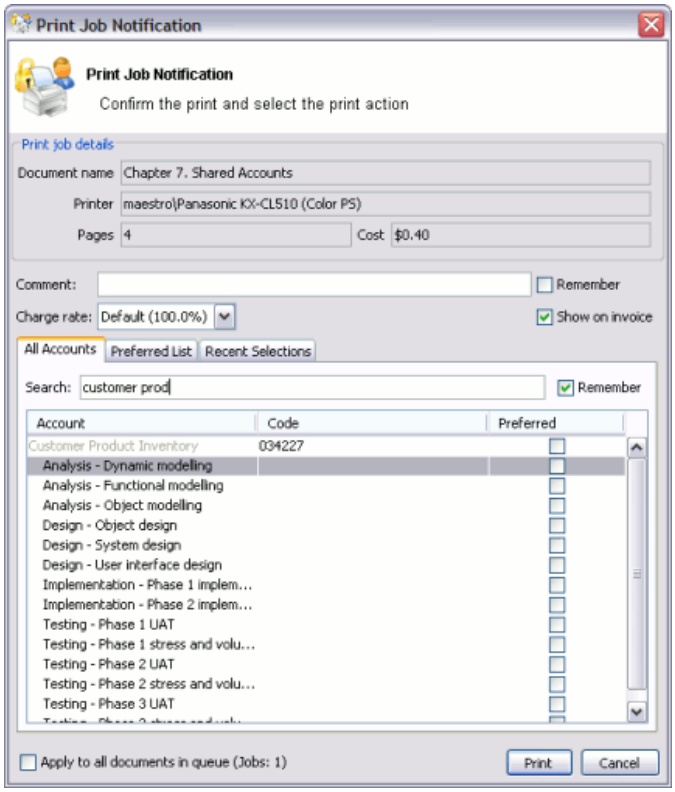


Figure 8.11. Searching accounts by project name or number in the project/phase code naming model

2. Searching by phase will display all matching project phases, plus the project name for each phase.

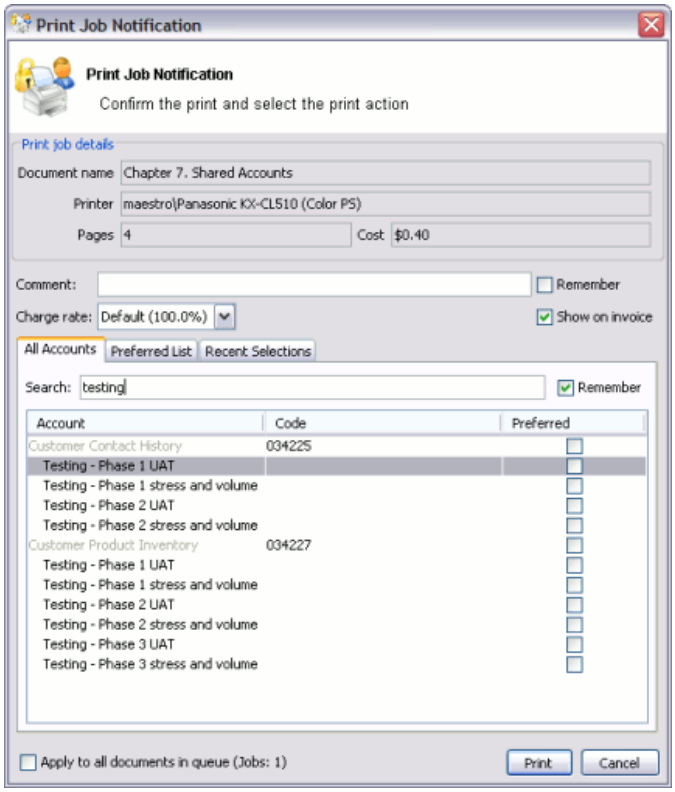


Figure 8.12. Searching accounts by phase in the project/phase code naming model

8.2.3. Customer / Job Naming Model

Organizations that deal with customers on a per-job basis will be familiar with the customer / job model, as will those who use common accounting software packages. In this model:

- Parent accounts are created for each customer
- Sub-accounts are created for each job

The basic principals of the customer / job naming model are the same as the project / phase naming model. See Section 8.2.2, “Project / Phase Naming Model”, substituting *project* for *customer* and *phase* for *job*.

8.3. Client Security

By default all printing is automatically charged to the user's personal account. For a user to be able to select a shared account the user needs to be granted access to the account selection popup.

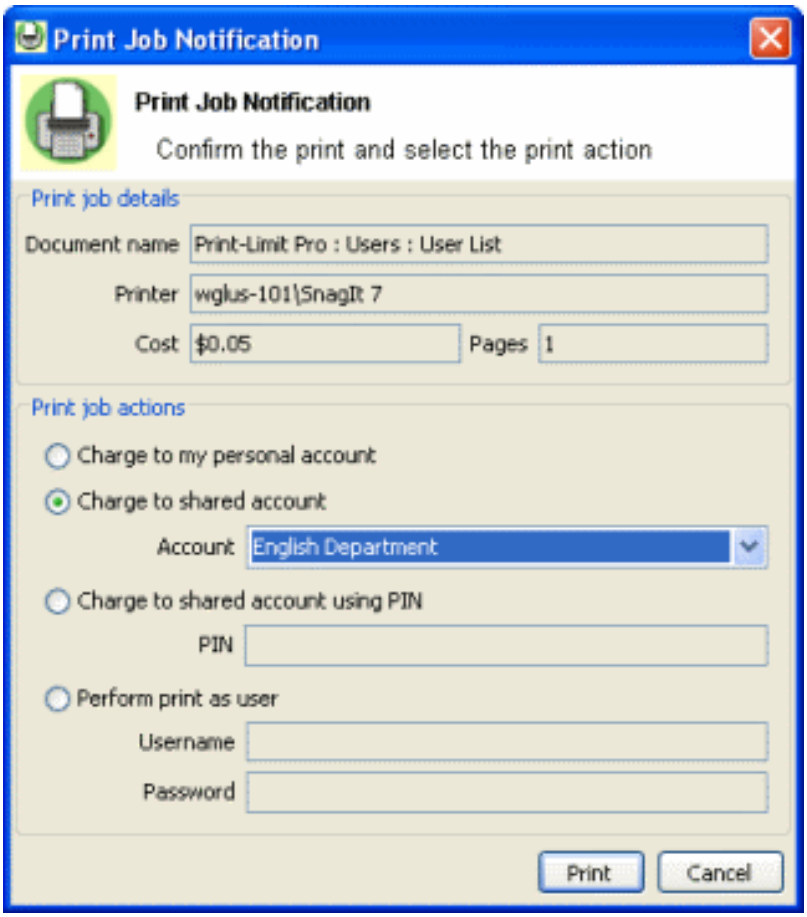


Figure 8.13. Selecting a shared account from the popup

Access to the account selection popup, as shown in the above figure, is controlled at the user level on the user's details page. The **Show the account selection popup** option needs to be selected for each user that requires access to shared accounts. System administrators might find the **Bulk user actions** section under the **User List** screen convenient for applying this change to many users.

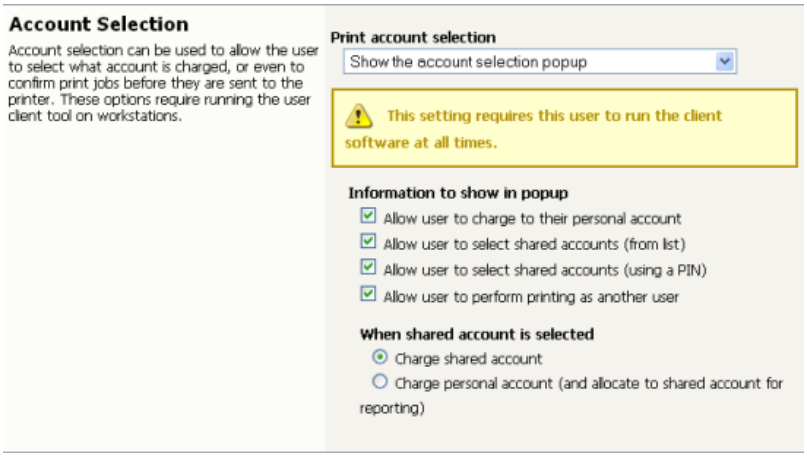

Account Selection
Account selection can be used to allow the user to select what account is charged, or even to confirm print jobs before they are sent to the printer. These options require running the user client tool on workstations.
Print account selection
Show the account selection popup
This setting requires this user to run the client software at all times.
Information to show in popup
Allow user to charge to their personal account
Allow user to select shared accounts (from list)
Allow user to select shared accounts (using a PIN)
Allow user to perform printing as another user
When shared account is selected
Charge shared account
Charge personal account (and allocate to shared account for reporting)

Figure 8.14. The user's popup settings under User -> User Details

Note

It is also possible to automatically charge printing to a single shared account without the need for the popup. This can be useful in environments where a user only ever needs to charge to a single shared account, and it is not desirable to display the popup.

Important

Users need to restart their workstation (or manually restart the Print-Limit client software) for this change to take effect.

Users with the **Show the account selection popup** option enabled need to be running the client software at all times. Print jobs will not print until the user has selected the account.

In addition to granting users access to the popup they also need to be granted access to a shared account. Shared accounts access can be controlled using two methods:

- Network group membership
- PINs (also known as security codes or passwords)

If an account is allocated a PIN (an alpha-numeric access code) users with knowledge of the PIN can select the account. A PIN based system would be a sensible selection in an organization when PINs are already in use for other systems such as photocopiers or door access codes.

Tip

PINs/codes can also be used when using parent and sub-accounts. To select a specific sub-account from the client software, both the parent and sub-account pins are required. They should be entered in the format of: `[parentPIN]-[subPIN]` (i.e. they are separated by a hypen).

An alternate method is to delegate access to the shared account via network group membership. One advantage of group based control is that users do not have to remember PINs. Most medium to large organizations will already have their network structured into suitable groups representing their position, title, department or work area. These existing groups may be used to control access. Access to shared accounts can also be granted on an individual user basis, however best practice suggests group-based management for medium to large networks.

Tip

In a Windows Active Directory environment, Organization Units are treated as special groups. Hence they also can be used to control access to a shared account.

Controlling access to shared accounts via group membership rather than individual user accounts is recommended. By using group based control, new users created on the network inherit the correct account access by virtue of their network group membership. This alleviates the need for additional user modification inside Print-Limit Pro.

To grant access to a shared account for all members in a given network group:

1. Log into the system as an administrator (i.e. admin account).
2. Select the **Accounts** tab.
3. Select the appropriate shared account from the list.

4. Click on the **Security** tab.
5. Select the appropriate group from the drop-down list.
6. Click the **Add** button.

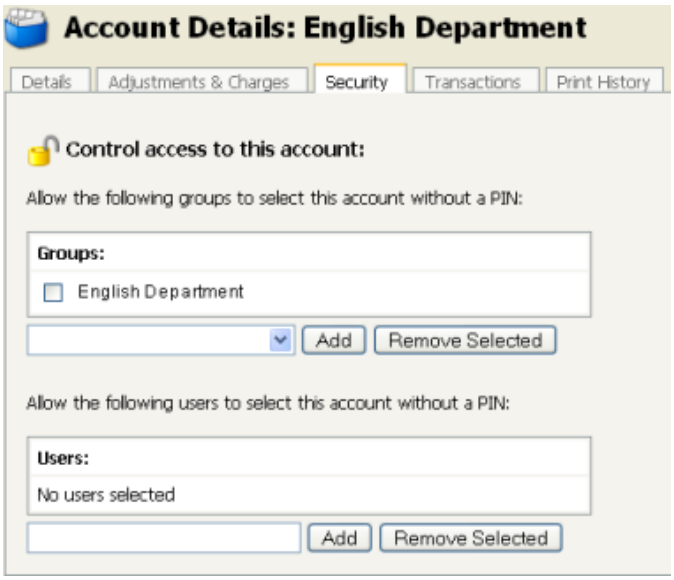


Figure 8.15. Setting up shared account security

Tip

Security settings of multiple shared accounts can be changed simultaneously by clicking on the **Bulk account actions...** link under the **Accounts** tab. More information is available in Section 6.4, “Bulk User Operations”.

8.3.1. Using account security with PIN/codes

PIN/codes provide a convenient way to select shared accounts. However this convenience may compromise security when short or guessable PINs are used. For this reason Print-Limit Pro allows the user/group security to be also applied to PIN/code access. This allows sites to use convenient and short codes with confidence that only authorized users are granted access.

To enforce user/group security for PIN/code access:

1. Log into the system as an administrator (i.e. admin account).
2. Go to the **Options** tab, to the **Account Options** section.
3. Change the **Access rules defined on shared account security tab apply to:** setting to **both PIN/code and selection from list**.
4. Click the **Apply** button.

With this setting changed, users can only select an account using PIN/code when they:

1. know the PIN/code; and
2. are in the shared account's user/group security

8.4. The Account Selection Popup

The account selection popup is a feature of the User Client that allows allocating printing to shared accounts. There are two types of account selection popup:

- *Standard account selection popup*

  The standard account selection popup provides the basic features required to charge to shared accounts. It's ideal for sites with simple account structures.

- *Advanced account selection popup*

  The advanced account selection popup includes additional features that are suitable when shared accounts are used frequently, and especially when many shared accounts exist.

- *Manager mode popup*

  The manager mode popup is designed for "print managers" that allows charging printing to any user or shared account, and apply adjustments to the job costs (e.g. for charge for special paper, binding, etc). The manager mode popup is often used in print rooms where staff perform printing on behalf of other users.

- *Automatically charge to a single shared account*

  This is a special mode that allows automatically charging all printing to a selected shared account, without any user interaction or popup.

8.4.1. Standard Account Selection Popup

The standard account selection popup offers four account selection types:

1. Charge to personal account.
2. Charge/allocate to a shared account selected by a PIN.
3. Charge/allocate to a shared account from list (taking into account security settings).
4. Perform print as another user (username and password required).

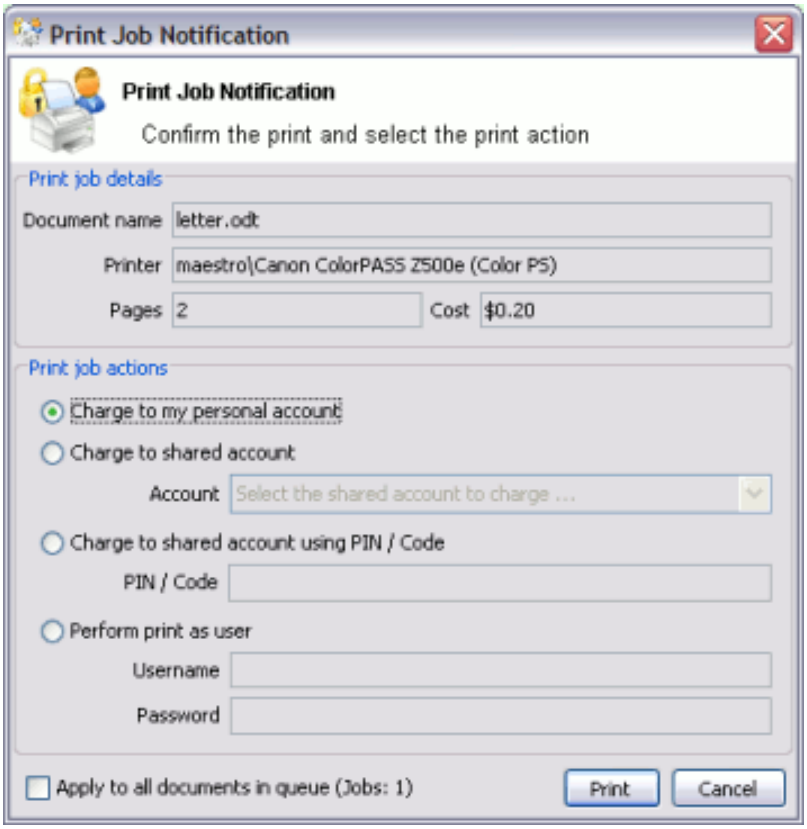


Figure 8.16. The standard account selection popup

When a user selects a shared account, there is the option to:

1. Charge the print to a shared account.
2. Charge the print to personal account (and allocate to shared account for reporting).

The option to charge a to personal account allows printing to be tracked against shared accounts while allowing the use of user-based quotas. When this option is selected, the cost of the print job is deducted from the user's personal account, but the job is allocated against the shared account which allows for account based print reporting.

The **Default shared account** can be set to speed up the process of selecting a commonly chosen account. When entered the selected account will be pre-selected in account selection popups.

System administrators can control on a per-user basis what options are available in the user's popup.

Note

Changes to the options available in the account selection popup come into effect immediately. There is no need to restart the client software for these settings to take effect.

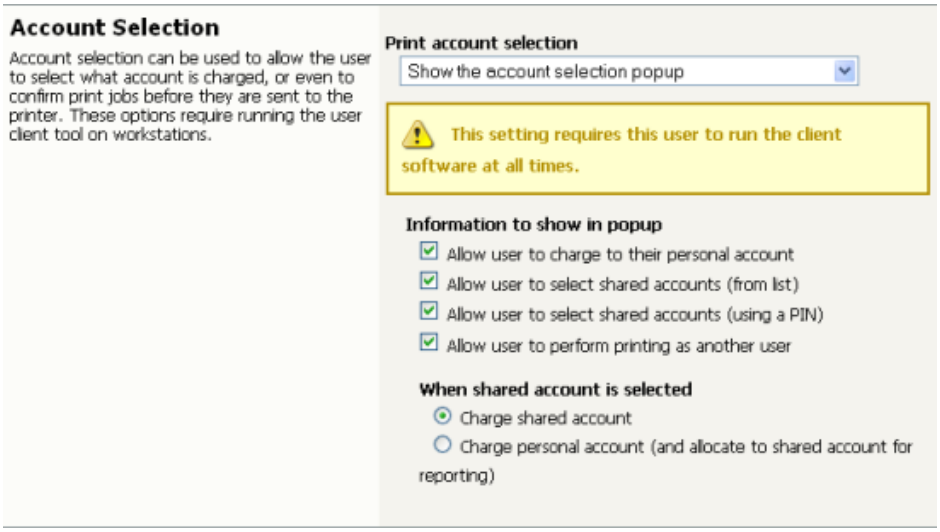

Account Selection
Account selection can be used to allow the user to select what account is charged, or even to confirm print jobs before they are sent to the printer. These options require running the user client tool on workstations.
Print account selection
Show the account selection popup
This setting requires this user to run the client software at all times.
Information to show in popup
Allow user to charge to their personal account
Allow user to select shared accounts (from list)
Allow user to select shared accounts (using a PIN)
Allow user to perform printing as another user
When shared account is selected
Charge shared account
Charge personal account (and allocate to shared account for reporting)

Figure 8.17. Client popup options defined on a per-user basis

The **Charge to personal account with popup notification** option displays a popup with no account selection features. This option is useful in environments where the system administrator desires to provide users with cost confirmation prior to printing.

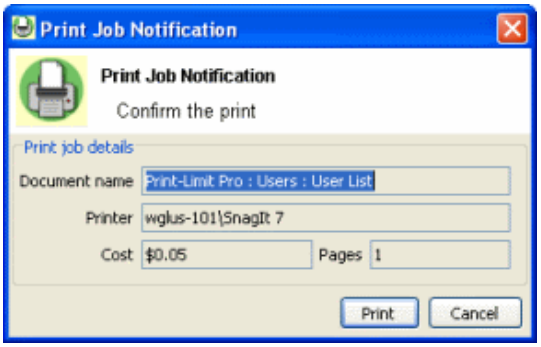


Figure 8.18. The print job confirmation dialog (no account selection options)

Tip

To educate the users about the pop-up confirmation window, administrators might find the End-user handout example helpful.

8.4.2. Advanced Account Selection Popup

The advanced account selection popup allows charging to personal or shared accounts, and has the following additional features:

1. *A searchable account list*

   The account list can be searched by the account name or code, making it much easier to find an account when there are many in the list. The search can also be remembered for next time.

2. *Structured account list*

The account list is hierarchical; that is, sub-accounts are shown indented from their parent accounts for clarity.

3. *A preferred list of accounts*

   The most commonly used accounts can be saved to a list. This is a useful feature when many accounts exist, but each user mostly just uses a few of them.

4. *A list of recently selected accounts*

   The accounts that have been recently selected are saved to a list for quick selection.

5. *Comments on print jobs*

   The advanced account selection popup allows assigning a comment to a print job for future reference.

6. *Cost Adjustments*

   Cost adjustments offer the ability to apply various adjustments to the cost of a print job. Adjustments can be a percentage rate, a per job adjustment or a per page adjustment. For example, a 200% adjustment could be defined for manually loading photo paper (charge twice the standard cost). Other common examples of adjustments include; Mylar Film, draft paper, draft printing mode, discounts for "special" customers/jobs, and extra for binding and manual handling. Cost adjustments are defined at either a global or printer level and are documented in detail in Section 7.9, “Cost Adjustments”.

7. *Option to not show a print job on invoices*

   Sometimes there are print jobs that need to be allocated to an account but not appear on any invoice reports. The advanced account selection popup has an option to allocate a 'non invoiceable' print job to an account.

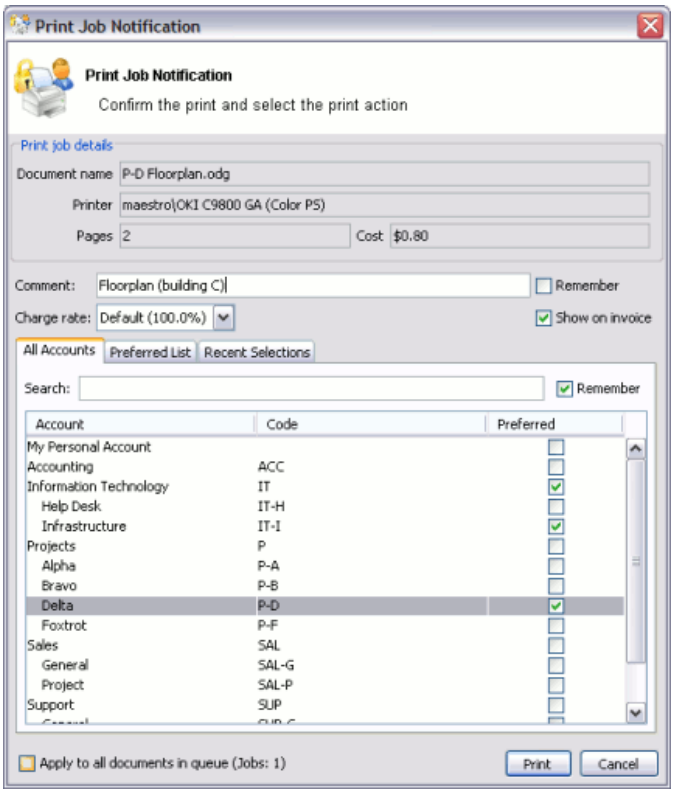


Figure 8.19. The advanced account selection popup

As in the standard account selection popup, there are two charging options for shared accounts:

- Charge shared account
- Charge personal account (and allocate to shared account for reporting)

The **Default shared account** can be set to speed up the process of selecting a commonly chosen account. When entered the selected account will be pre-selected in account selection popups.

8.4.2.1. Enabling the Advanced Account Selection Popup For All Users

In a professional (client billing) installation the advanced account selection popup is often enabled for all users, so that every user is prompted for a shared account (client) to charge when printing.

Once the client software is deployed on user workstations (covered in Section 5.2.1, “User Client Deployment”), the account selection popup may be enabled. The popup can be enabled on one user at a time or can be enabled for all users in bulk. To enable the popup for all users in bulk:

1. Log into the admin interface.
2. Navigate to **Usres** → **Actions** → **Bulk user actions...**
3. By default the action will be applied to all users (the special `[All Users]` group). To apply the action to a subset of users (a user group), select that group from the dropdown list.
4. In the section **Change settings**, enable the option **Change account selection setting** and select the option **Show the advanced account selection popup** from the dropdown list.
5. If you do not want to allow users to charge printing to their personal account (i.e. they must select a shared account) then disable the option **Allow user to charge to their personal account**.
6. Press **OK** and confirm the operation. Once completed, the selected users will have the account popup enabled.

Once the popup has been enabled on all users some testing should be performed from users' desktops. To test, log into a user workstation, perform a print and confirm that the account popup appears and the job is logged as expected.

8.4.3. Manager Mode Popup

The manager mode popup popup is designed to be used by authorized users to perform printing on behalf of other users (e.g. in a school's print room when jobs are emailed in with often complex instructions such as binding, color paper covers, etc.). The approved user can charge printing to users' personal accounts or any shared account. This popup provides the following features:

1. *Charge printing to any user*

   The manager enters the user's username or ID number. The printing will be logged under this user's account.

2. *Charging to any account*

   The print job may be charged from the user's personal printing account or any of the shared accounts in the system. The shared accounts may be selected from a list, or using the account code/PIN.

3. *Standard cost adjustments*

   Standard cost adjustments provide a list of adjustments that can be applied to the cost of a print job. The print manager can select one or more standard adjustments to apply to a given print job. Adjustments can be a percentage rate, a per job adjustment or a per page adjustment. For example, a 200% adjustment could be defined for manually loading photo paper (charge twice the standard cost). Other common examples of adjustments include; Mylar Film, draft paper, draft printing mode, discounts for "special" customers/jobs, and extra for binding and manual handling. These adjustments can be defined on the server at a global or printer level and are documented in detail in Section 7.9, “Cost Adjustments”.

4. *Custom cost adjustments*

   If none of the standard adjustments are applicable, the print manager can easily apply a custom per page or per job adjustment. Examples could include special binding, delivery, etc.

5. *Comments on print jobs*

   Allows assigning a comment to a print job for future reference. e.g. to explain the reason for the cost adjustments.

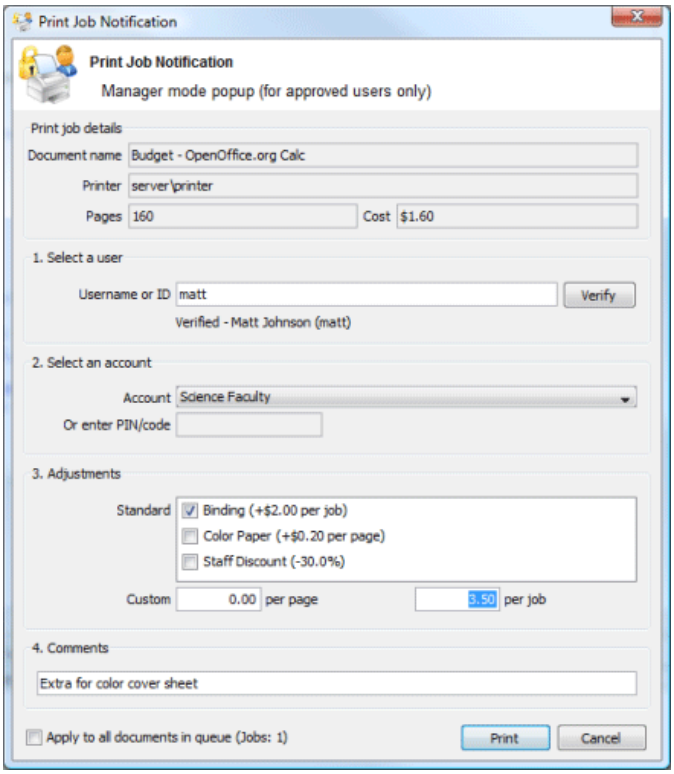


Figure 8.20. The manager mode popup

8.4.4. Automatically charge to a shared account

This special account selection mode allows all printing to be automatically charged to a single shared account, without user interaction or the need to run the User Client software on the workstation. This mode is useful when a user will only ever charge printing to a single shared account and does not want the inconvenience of responding the the account selection popup then they print.

An example of where this would be useful is in a school or business environment where shared accounts represent a department within the organisation. In this situation user printing should be automatically allocated to a single shared account without any user interaction. Although this can mostly be achieved with the standard account selection popup, it requires the user to respond to each popup when they print.

This option can be selected for an individual user, set on multiple users using the **Bulk User Actions** or set in the initial user settings in the **Group** section. Once the **Automatically charge to a shared account** option is selected, then enter the account name to charge. To select a sub-account the account name must be entered in the parent\sub-account format.

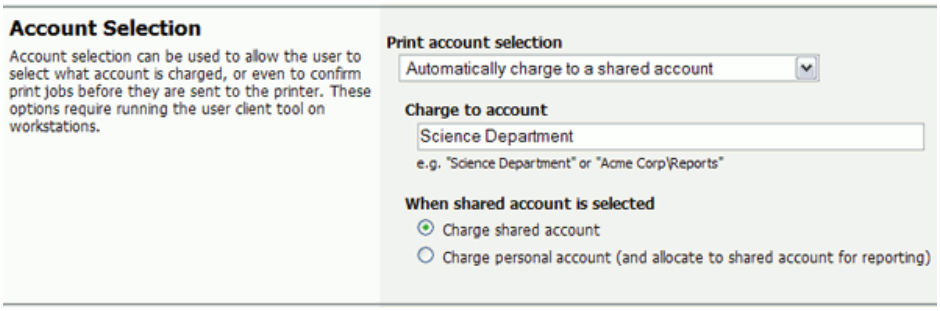

Account Selection
Account selection can be used to allow the user to select what account is charged, or even to confirm print jobs before they are sent to the printer. These options require running the user client tool on workstations.
Print account selection
Automatically charge to a shared account
Charge to account
Science Department
e.g. "Science Department" or "Acme Corp\Reports"
When shared account is selected
Charge shared account
Charge personal account (and allocate to shared account for reporting)

Figure 8.21. Account selection option to automatically charge to a shared account

8.5. Account Selection in Non-Domain Environments (Workgroups)

Many small networks may not be controlled via a central domain server. These networks are sometimes referred to as workgroups or peer-to-peer networks. On these networks users may not log on to their desktop, or computers may be shared by multiple users. The **Allow user to perform printing as another user** option may be useful in non-domain/logon environments. User accounts can be set-up in the system hosting the printers and users can select their account using usernames and passwords for each print job, irrespective of which user account is currently logged onto the workstation.

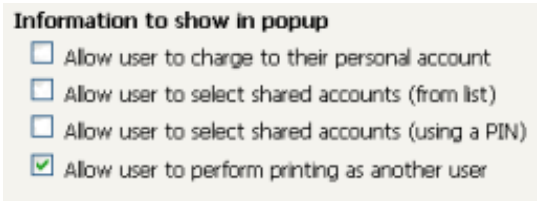

Information to show in popup
Allow user to charge to their personal account
Allow user to select shared accounts (from list)
Allow user to select shared accounts (using a PIN)
Allow user to perform printing as another user

Figure 8.22. Configuration allowing only selection of other user accounts

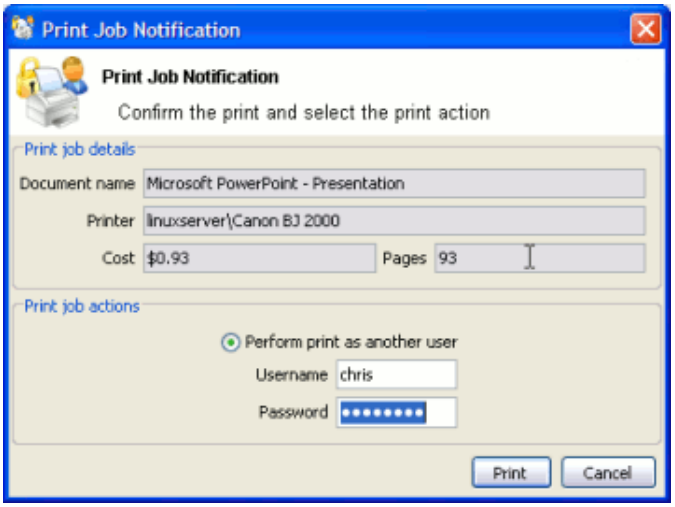


Figure 8.23. Popup requesting the user to enter their username and password

Tip

Print-Limit Pro can also be configured to manage its own set of user accounts. See Section 25.1,

"Internal Users (users managed by Print-Limit Pro)" for more details.

8.6. Batch Shared Account Import and Update

The batch import and update feature allows the administrator to import accounts, and optionally update existing account details by reading data from a simple text file or directory structure. In addition to being able to create accounts, it enables administrators to update the following account data:

- Enabled / disabled status
- Account PIN / Code
- Credit balance
- Restriction status
- Users allowed to use the account
- Groups allowed to use the account
- Invoicing options
- Comment options
- Notes

Examples of where the batch import feature is useful include:

- When importing account and balance data from another external system (e.g. a project management or accounting system).
- To reset the account balances at the end of a billing period (year/term/semester).
- To bulk update the users and groups who are allowed to use/access the accounts (security).

Tip

To update shared accounts from a tab delimited file on a regular basis, see Section 8.7, "Shared Account Synchronization" instead. You can also synchronize shared accounts against the directory structure of a file system, for example when there is a separate folder for each department or customer.

To perform a batch import:

1. Manually inspect your file in a text editor and ensure it's in the prescribed tab-delimited format as detailed at Section 8.6.1, "Batch Account Import File Format".
2. Navigate to the **Accounts** section.
3. Click the **Batch Import / Update** tab.
4. Click **Browse** to select the file to import. (The format of the file is described in Section 8.6.1, "Batch Account Import File Format").
5. Choose whether you want to delete accounts that exist in Print-Limit Pro but not in the import file.
6. Press the **Test Settings** button.
7. The window shown will tell you how many lines were processed, and how many shared accounts will be imported, updated or deleted when **Import** is pressed.
8. If you are happy with the results of the test, press the **Import** button.

Tip

Consider testing your import file format with a small sample first (e.g. maybe a copy of the file containing only the first five lines). This way any formating mistake will only propagate to a few accounts rather than all!

Some example shared account import files can be found at `[app-path]/server/examples/import/shared-accounts/` in both Excel and TSV (tab separated values) formats. The Excel format may be used to produce the TSV format by saving as `Text (Tab delimited)`. Examples include a flat list of accounts using the example of departments in a school (`school-departments.tsv`) and another with subaccounts using the example of a client-matter layout for a business' clients (`client-matter.tsv`).

8.6.1. Batch Account Import File Format

The import file is in tab delimited format and contains the following fields in the given order.

No.	Field	Description	Optional?
1.	Parent Account Name	The name of this account's parent. When creating a top level account, leave the sub-account name blank (and this will be the account's name).	Mandatory
2.	Sub-account Name	When creating a sub-account (1 level deep only), enter its name here.	Optional - account will be top level if blank
3.	Enabled	Whether or not this account is enabled. (Y/N where Y = YES, and N = No).	Optional - account will be enabled if blank
4.	Account PIN/Code	The account PIN/Code. For parent accounts, the code must be unique for all parent accounts. For sub-accounts, the code must unique amongst accounts with the same parent account.	Optional - PIN not set if blank
5.	Credit Balance	The account balance.	Optional - Balance set to 0 if blank
6.	Restricted Status	The account's restricted status. (Y/N where Y = YES, and N = No).	Optional - if blank, set to a configurable default
7.	Users	Modifies the users that are allowed to select this account from the list (no CODE/PIN required). The access list may be modified as follows: • To replace the previously defined access list, use a pipe (`|`) delimited list of usernames. e.g. `user1|user2|user3` sets the list to these three users (removing any previously defined). • To add users to the existing access list, prefix the pipe delimited user list with a plus sign (+). e.g. `+user1|user2|user3` adds these three users to the access list. • To remove users from the existing user list, prefix the pipe delimited user list with a hyphen (-). e.g. `-user1|user2|user3` removes these three users from the access list. • To remove all users from the access list, enter a hyphen (-).	Optional - users are not updated if blank
8.	Groups	Modifies the groups that are allowed to select this account from the list (no	Optional - groups are not updated if blank

No.	Field	Description	Optional?
		CODE/PIN required). To reference the special 'All Users' group, use the syntax `[All Users]`. The access list may be modified as follows: • To replace the previously defined access list, use a pipe (`|`) delimited list of groups. e.g. `group1|group2|group3` sets the list to these three groups (removing any previously defined). • To add groups to the existing access list, prefix the pipe delimited group list with a plus sign (+). e.g. `+group1|group2|group3` adds these three groups to the access list. • To remove groups from the existing group list, prefix the pipe delimited group list with a hyphen (`-`). e.g. `-group1|group2|group3` removes these three groups from the access list. • To remove all groups from the access list, enter a hyphen (`-`).	
9.	Invoice Option	The invoicing option defines how prints allocated to this account are invoiced. Available values are: `ALWAYS_INVOICE` - prints allocated to this account are always invoiced `NEVER_INVOICE` - prints allocated to this account are never invoiced `USER_CHOICE_ON` - it is up to the user whether or not to invoice prints allocated to this account. The default is yes. `USER_CHOICE_OFF` - it is up to the user whether or not to invoice prints allocated to this account. The default is no.	Optional - set to USER_CHOICE_ON if blank
10.	Comment Option	The comments option defines whether or not comments should be added to prints allocated to this account. Available values are: `NO_COMMENT` - comments may not be added `COMMENT_REQUIRED` - comments must be added `COMMENT_OPTIONAL` - it is up to the user whether or not to add a comment	Optional - set to COMMENT_OPTIONAL if blank
11.	Notes	Notes about the shared account (placed in the Notes field).	Optional - notes not set if blank

Table 8.1. Shared Account Import File Format

Other limitations: Although any actual limit to the size of an import file should be large enough for any purpose, we recommend keeping the file size below 10MB.

Tip

A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, and then save it in the `Text (Tab delimited)` format.

8.6.1.1. Import File Format Examples

The following lines shows importing all the above fields. (The fields are separated by tabs).

```
Maths   Y 12  5 N user1|user2 group1|group2 ALWAYS_INVOICE COMMENT_REQUIRED
Science Physics Y 1620 100 Y user3   NO_COMMENT A Note
Science Biology N 16 12.50 N   group3  USER_CHOICE_OFF
```

The following lines show updating only the groups that can access the account. NOTE: The tabs still exist for the enabled status, pin, balance, restriction and users fields, but each entry is blank.

```
Maths           group1|group2|group3
Science Physics         group1
Science Biology         group3
```

Tip

The shared account import process can be triggered via the command-line scripting tool *server-command*. See Section A.1, “Server Commands (server-command)”.

8.7. Shared Account Synchronization

The shared account synchronization feature allows the administrator to define an external source for shared accounts. This is useful for situations where shared accounts are managed by an external system, and allows Print-Limit Pro to mirror the accounts without any additional administration.

To enable shared account synchronization:

1. Navigate to the **Accounts** section.
2. Click the **Account Sync** tab.
3. Choose appropriate settings. The available settings are discussed in Section 8.7.1, “Synchronization Options”.
4. Press **Test Settings**
5. The window shown will tell you how shared accounts were processed, and how many shared accounts will be imported, updated or deleted when **Synchronize Now** is pressed.
6. If you are happy with the results of the test, press the **Synchronize Now** button. This will trigger a shared account synchronization, and synchronization will continue to occur at the chosen interval.

8.7.1. Synchronization Options

Shared Accounts can be synchronized against two possible sources: a text file or a directory structure. This is configured in the first option on the **Account Sync** tab: **Sync source**.

- *Text file* - Synchronize shared accounts against a text file. The format of this text file is discussed in Section 8.6.1, “Batch Account Import File Format”.
- *File System Directory Scan* - Synchronize shared accounts against a directory structure. Many organizations will have a 'Customers' folder or similar in their file system which will contain one folder per customer. For example, given `Customers/Client 1` and `Customers/Client 2`, synchronizing against the `Customers` directory will import `Client 1` and `Client 2` as shared accounts.

Tip

The location of the text file or directory (the sync source) is relative to the system where Print-Limit Pro is installed, not the system being used to access the admin interface. The sync source should either be physically on that system, or accessible via a mapped / mounted drive. Additionally, the source should have permissions to be readable by the `Local System` account on Windows, or the `printlimit` account on Mac or Linux.

The other options include:

- *File location / directory location* - The location of the file or directory to sync against. The location is relative to the server.
- *Perform sync* - How often the account sync should take place. The available options are **Hourly** and **Overnight**. If new accounts are being added regularly throughout the day, **Hourly** is probably the best choice. The **Overnight** sync occurs nightly at approximately 12:55am.
- *Treat subdirectories as sub-accounts* - This option is only available with directory synchronizing against a directory. When checked, subdirectories will be treated as sub-accounts. For example, a directory structure of `Customers/Client 1/Project 1` will produce a top level account called `Client 1` and a sub-account of `Client 1` called `Project 1`.
- *Delete accounts that do not exist in the selected source* - This option will delete accounts that exist in Print-Limit Pro but not in the sync source. Use this option to clean out 'old' accounts. This option is not 'remembered' for the automatic synchronization, so accounts can only be deleted by checking this box and pressing **Synchronize Now**. Deleting is a destructive operation. Don't forget to perform a test first and a backup is also advised!

8.8. Bulk Shared Account Operations

A bulk shared account operation refers to an operation that is applied to more than one shared account. There are occasions where the same task needs to be performed on multiple accounts. With a large number of shared accounts, it may take too long to perform the task manually on each one; this is where bulk account operations are useful.

Bulk account actions... can be found in the **Actions** list while on the **Accounts** tab.

Some examples of where bulk account operations might come in useful include:

- Shared account balances need to be reset at the start of a new billing period.
- A new printing policy or account model is being introduced, and needs to be rolled out across all shared accounts.
- Shared accounts are to be temporarily disabled. For example over the holiday period when there should be no shared account based printing.
- A particular group needs to be given access to all the shared accounts.

Warning

The bulk account operations are one-way and cannot be undone. Always carefully consider the operation before proceeding. If you are unsure of the function or behavior, performing a backup prior to undertaking the operation is advised.

The following tasks can be performed through bulk account operations:

- Adjust of set the accounts' credit (perform a transaction)
- Change the accounts' restriction status

- Disable the accounts for a specified period of time
- Change the invoicing option
- Change the comments option
- Change the cost multiplier
- Change the security settings
- Change quota scheduling settings

8.9. Shared Account Quota Allocation

Sometimes organizations want to control printing to shared accounts. This can be done by allocating quotas on a periodic basis.

To allocate a $100.00 weekly quota to `Science` account:

1. Navigate to the **Accounts** tab.
2. Select the account.
3. Under the Quota Scheduling section, select a period of **Weekly** and enter 100.00 in the **Schedule amount**.
4. Click **Apply**.

Quota for shared accounts gets allocated very similar to group quota. See Section 6.2, “Setting up quota allocations” for more details about quota scheduling.

For details about scheduling times please refer to Table 6.1, “Quota schedule times”.

8.10. Shared Account Cost Multiplier

Sometimes organizations will want to charge different amounts to different shared accounts. This can be done by setting a cost adjustment multiplier on a shared account. For example, by setting the **Multiply cost by** to 50%, then printing to the shared account will cost 50% less. Setting the **Multiply cost by** to 125% will cost 25% more.

To provide a discount to the example "Administration" shared account please follow the steps listed below:

1. Navigate to the **Accounts** tab.
2. Select the "Administration" account.
3. Under the Advanced Options section, select the option **Multiple cost by** and enter 50.
4. If you want to apply same cost adjustment to all it's sub accounts of "Administration", then select the option **Apply to all sub accounts**.
5. Click **Apply**.

If you want to apply same settings to multiple accounts you can use **Bulk account actions**. For details please see Section 8.8, “Bulk Shared Account Operations”.

8.11. Advanced Shared Account Options

It is possible to customize the functionality of shared accounts to suit a wide range of uses. There are several advanced options available throughout Print-Limit Pro to control this customization:

- *Make shared account PIN/code visible*

  When this option is active, the purpose of the shared account PIN is changed. Usually the PIN is equivalent to a password, and can be required before a user is able to charge to a shared account. When this setting is active, the PIN is treated as a 'code' instead; that is, a unique identifier for a given shared account. For example, an organization dealing with projects might allocate a shared account the project code `123`.

When this option is active it has several effects throughout Print-Limit Pro, including:

- The shared account list (on the **Accounts** tab) includes the shared account code.
- Reports dealing with shared accounts display the code.
- On the account selection popup dialogue of the user client tool, the code is visible when entering (i.e. it is no longer hidden by stars). This allows charging to a shared account by code, rather than scrolling through the dropdown list to find the correct account by name.

To activate this option:

- Go to the **Options** tab
- Check the option **Make shared account PIN/code visible**
- Press **Apply**

- *Apply to all documents in queue*

  This option appears at the bottom of both the standard and advanced account selection popups. When checked, the settings being applied to the current print job will be applied to all waiting jobs automatically. The text will let you know how many jobs this will affect (e.g. "Jobs: 5").

  This setting is useful when printing a batch of documents for the same purpose. For example, when printing a letter, diagram and spreadsheet for a client, the client account can be selected on the account selection popup along with any other appropriate settings, and the settings will be applied to all three jobs. This saves the time taken to apply the settings for each job.

- *Changing the time after which jobs are deleted when awaiting popup response*

  If a user does not respond to the account selection popup after a defined time, their print job will be automatically deleted. This is to prevent a buildup of old jobs in the print queue. For more information see Section A.5, “User Client Options”.

Chapter 9. Reports

A report is a representation of data, often in a printable tabular format. Print-Limit Pro provides a set of built-in reports. These include simple pre-built reports accessed via one-click, up to more advanced reports constructed using custom filters.

Tip

Print-Limit Pro is an open system. System administrators with database management experience may choose to run the system on an external database system. 3rd party reporting tools can then be used to construct custom reports. The Netop Development team can also consult on custom report development.

Reports can be produced by selecting the date range and then clicking on one of the report format icons. Common date ranges, such as **Last 30 days**, and **Previous Month** can be selected via the drop down box. The **Ad-hoc** option may be used to generate the reports with custom date ranges and filters (e.g. generate a **User printing - summary**report limited to a particular department). A sample of each report can be seen by clicking on the **Show sample** link. A sample report gives an indication of what the final report will look like.

Figure 9.1. An example report displaying different date ranges

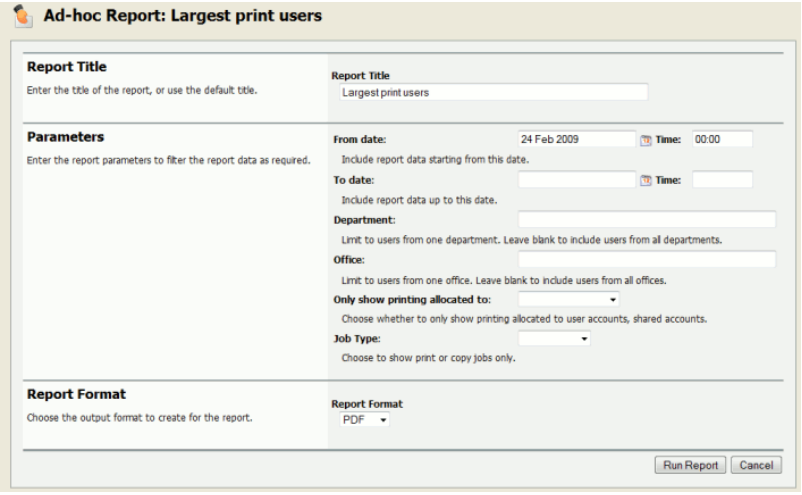

Ad-hoc Report: Largest print users
Report Title
Enter the title of the report, or use the default title.
Report Title
Largest print users
Parameters
Enter the report parameters to filter the report data as required.
From date:
24 Feb 2009
Time:
00:00
Include report data starting from this date.
To date:
Time:
Include report data up to this date.
Department:
Limit to users from one department. Leave blank to include users from all departments.
Office:
Limit to users from one office. Leave blank to include users from all offices.
Only show printing allocated to:
Choose whether to only show printing allocated to user accounts, shared accounts.
Job Type:
Choose to show print or copy jobs only.
Report Format
Choose the output format to create for the report.
Report Format
PDF
Run Report
Cancel

Figure 9.2. Selecting Ad-hoc date ranges and filters for reports

9.1. Report types

The *one-click* reports accessed under the **Reports** section can be grouped into the following areas.

9.1.1. User Reports

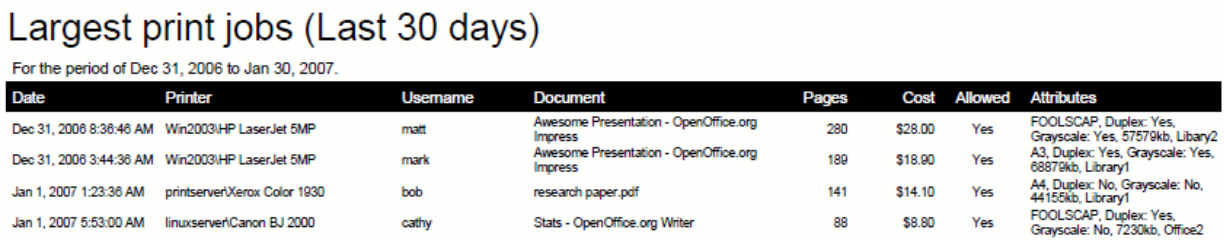
These are reports producing information about users. They range from a list of users, their names and current account balance, to detailed reports listing all print jobs printed by a user over a particular time-frame.

9.1.2. Printer Reports

Printer reports produce information on printers including configuration, usage summaries and statistics.

9.1.3. Print Log Reports

The print log is a detailed list of all printing performed on the network. The print log reports allow administrators to produce reports list all jobs over a given date range with simple one-click version for today's print jobs and largest print jobs.



Largest print jobs (Last 30 days)

For the period of Dec 31, 2006 to Jan 30, 2007.

Date	Printer	Username	Document	Pages	Cost	Allowed	Attributes
Dec 31, 2006 8:36:46 AM	Win2003\HP LaserJet 5MP	matt	Awesome Presentation - OpenOffice.org Impress	280	$28.00	Yes	FOOLSCAP, Duplex: Yes, Grayscale: Yes, 57579kb, Libary2
Dec 31, 2006 3:44:36 AM	Win2003\HP LaserJet 5MP	mark	Awesome Presentation - OpenOffice.org Impress	189	$18.90	Yes	A3, Duplex: Yes, Grayscale: Yes, 68879kb, Library1
Jan 1, 2007 1:23:36 AM	printserver\Xerox Color 1930	bob	research paper.pdf	141	$14.10	Yes	A4, Duplex: No, Grayscale: No, 44155kb, Library1
Jan 1, 2007 5:53:00 AM	linuxserver\Canon BJ 2000	cathy	Stats - OpenOffice.org Writer	88	$8.80	Yes	FOOLSCAP, Duplex: Yes, Grayscale: No, 7230kb, Office2

Figure 9.3. Printer log PDF report

9.1.4. Group Reports

These reports group printer usage by network group allowing system administrators to determine which group of users performs the most prints. These reports are ideal for gaining a quick overview of printing costs performed by work area, department, floor, management level, etc.

9.1.5. Shared Accounts Reports

Administrators may use the shared account reports to track printing allocated to shared accounts via the popup.

9.1.6. Transaction Reports

These provide a summary of the transactions / balance adjustments.

9.1.7. Environmental Impact Reports

These reports summarize the environment impact of printing.

9.1.8. Ratio Reports

These reports compare relative printing usage.

9.1.9. Period Comparison Reports

These reports compare printing activity between two periods.

9.2. Report Formats

All reports are available in three different formats. Access to all formats depends on the software installed on your system. Alternate formats are accessed via the three icons located next to the report period drop down box.

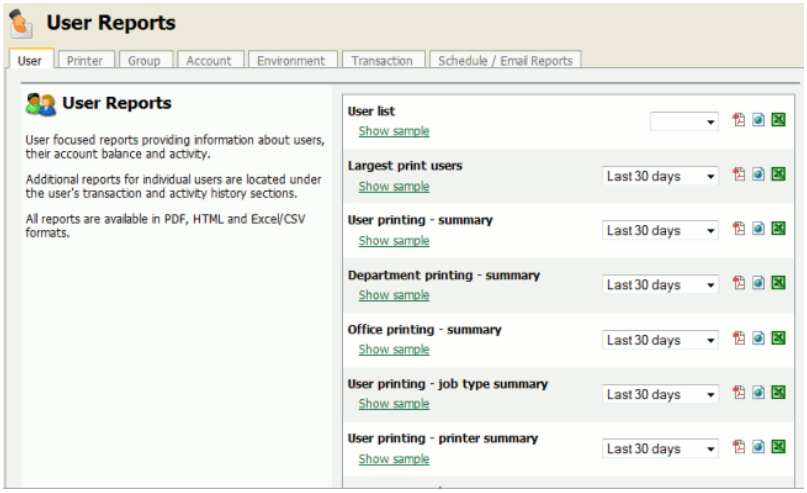


Figure 9.4. Clickable report icons to run reports in different formats (PDF, HTML, CSV (Excel)).

There are three report formats available.

Format	Description
PDF Reports	PDF is the most appropriate format for printing. To view these reports your computer must have a PDF viewer installed. Adobe Acrobat Reader is a free PDF viewer available from adobe.com.
HTML Reports	HTML Reports will work on all systems and don't require an external PDF viewer. These reports may not print or format as well as the PDF versions and are designed for either a quick review of data or for systems that don't have a PDF viewer.
CSV/Excel Reports	The CSV/Excel reports can be used to access the data in plain text format. The format is suitable for importing data into programs such as Microsoft Excel.

Table 9.1. Report Formats

9.3. Combining Filters and Reports

All data list views in Print-Limit Pro have export/print option linked at the bottom of the list. The **export/print** links run a report over the data currently displayed in the list. The lists column order and filter options are taken into consideration when generating the report data. This functionality can be used to produce ad-hoc or custom reports. This functionality is best described by example.

To run a report to see who and how much people have printed against a shared account over the month of September:

1. Navigate to the **Accounts**.
2. Click on the appropriate shared account.
3. Select the **Job Log** tab.
4. Click the **Show Filters** link.
5. Select the 1st of September in the **from date** and enter the 30th of September in the **to date**.
6. Click **Apply Filter** button. The data displayed in this list should be all print jobs printed against this shared account for the month of September.
7. Click on the **Summary by user** link to produce the PDF report.

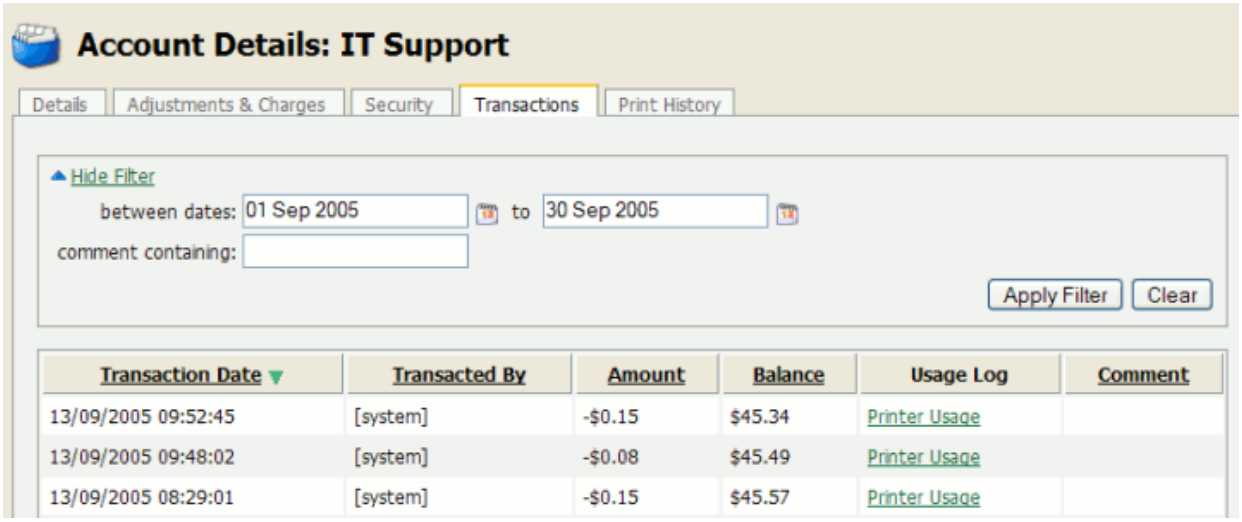


Figure 9.5. Filters applied to the shared account print log

To run a report listing all transactions issued against a user's account over the month of September ordered by transaction amount:

1. Navigate to the **Users** tab.
2. Click on the appropriate user account. The user details page will display.
3. Select the **Transactions** tab.
4. Click the **Show Filters** link.
5. Select the 1st of September in the **from date** and enter the 30th of September in the **to date**.
6. Click **Apply Filter** button.
7. Click on the **Amount** column to order the data by amount value.
8. Click on the **Export/Print** button at the bottom of the list to produce the report.

9.4. Scheduling and Emailing Reports

The one-click reports in the Print-Limit Pro web interface are good for finding important data fast, however sometimes it is more convenient to have important data 'pushed' to interested parties. This can be achieved through the use of *scheduled reports*.

Print-Limit Pro can schedule reports to run periodically and have them automatically sent out via email or saved to a folder. Scheduling reports can be used for a variety of purposes, for example:

- Sending a department manager a summary of the department staff's printing.
- Sending a teacher a summary of printing for each student in their class.
- Producing and using a CSV report saved to disk to import into an external system, such as an accounting package.
- Producing a regular report for billing or invoicing purposes.

9.4.1. Usage

The scheduled reports page can be found at **Reports** → **Scheduled Reports**.

Important

Before scheduled reports can be sent via email, Print-Limit Pro needs to know where to find a SMTP server (outgoing email server). For information about how to configure email notifications, see Section 12.6.1.3, “Configuring Email Notifications”.

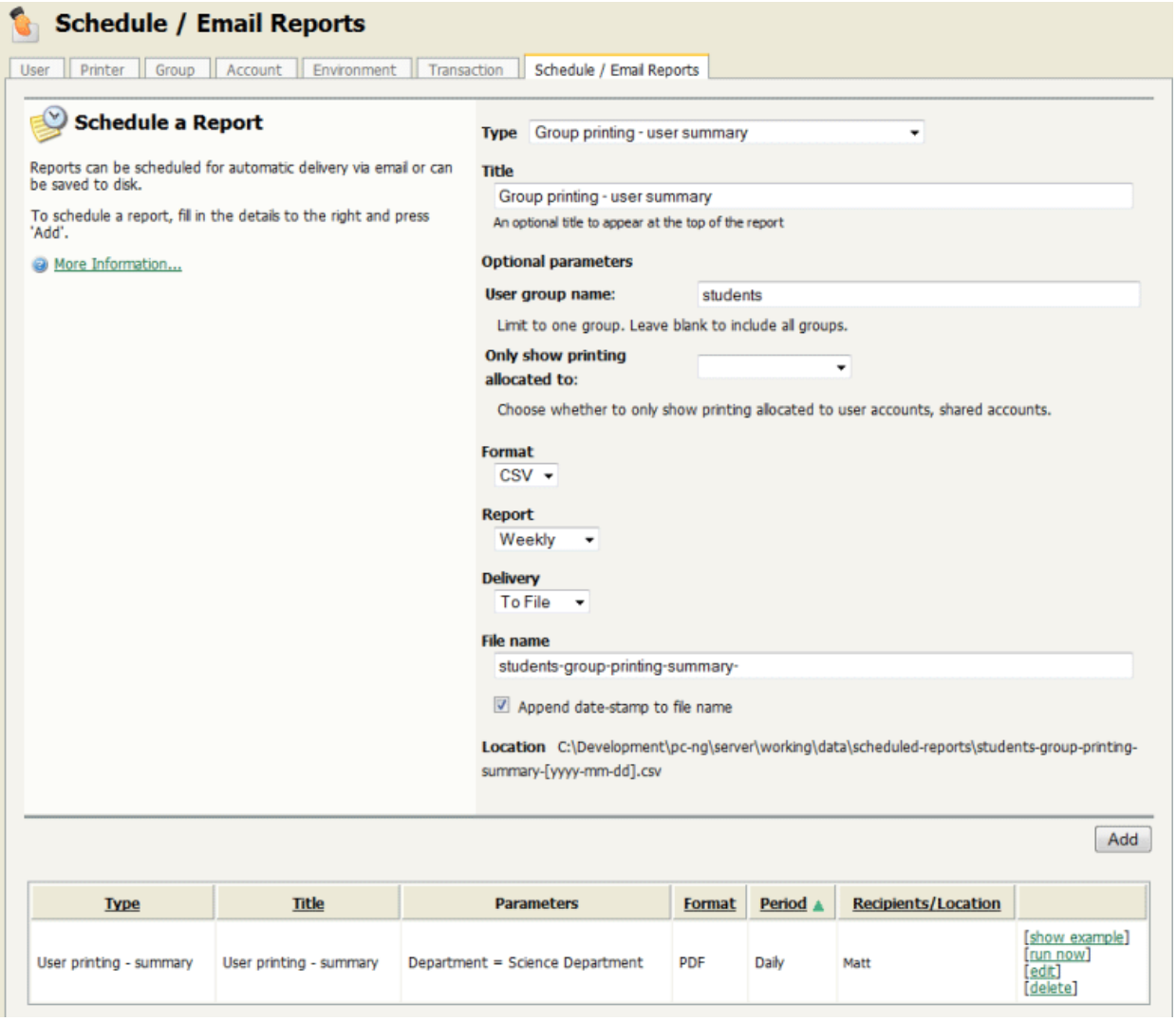


Figure 9.6. The Scheduled Reports page

To create a scheduled report, choose the desired report options and press **Add**. The process is best described by way of example:

9.4.1.1. Example 1: Faculty based reporting in education

Joe is head of the science faculty at a university. Faculty staff have the ability to charge printing back to the faculty. Joe would like to see, on a regular basis, how much printing each user charges to the faculty.

To do this:

1. Navigate to the **Scheduled Reports** page.
2. Click **Schedule a new report...** if the panel is not already displayed.
3. Choose the report **Type** of **Shared account printing - user summary**.
4. Under **Optional parameters** → **Account name**, enter Joe's faculty shared account name, *Science*.
5. Change the report title to "Science Faculty Account Printing".
6. Leave the report **Format** as **PDF**.
7. Make the report deliverable every week by setting **Report** to **Weekly**.
8. Set the **Delivery** to **By email**.
9. Enter Joe's email address under **Recipients**.
10. Press **Add**.

The report is now scheduled to run every week, and should now be shown in the table on the bottom of the page. Joe will receive an email every Sunday showing the previous week's printing in his faculty. To find out exactly when the report will be sent, see Section 9.4.2, “Details”. To see an example of what the report will look like, press **[show example]** next to the report. To manually run the report (generate it and email to Joe now), press **[run now]**. The

The **[run now]** operation also provides a convenient way to resend the previous period's report if the original delivery failed or if the email was accidentally deleted.

9.4.1.2. Example 2: Division based reporting in business

Mary is head of the marketing division at a company. She would like to see which printers her staff use most, to make decisions about printer redistribution and purchasing. Also of interest are the sizes of paper being used, and how much color printing is being performed.

To do this:

1. Navigate to the **Scheduled Reports** page.
2. Click **Schedule a new report...** if the panel is not already displayed.
3. Choose the report **Type** of **Group printing - printer summary**.
4. Under **Optional parameters** → **Group name**, enter Mary's division group name, *Marketing*.
5. Leave the report **Format** as **PDF**.
6. Make the report deliverable every fortnight by setting **Report** to **Fortnightly**.
7. Set the **Delivery** to **By email**.
8. Enter Mary's email under **Recipients**.
9. Press **Add**.

The report is now scheduled to run every fortnight, and should now be shown in the table below. Mary will receive an email every second Sunday showing the previous fortnight's printer usage by her division.

9.4.1.3. Example 3: Create reports to import into external system

*John is the head of the accounting department in the organization and wants to charge his clients for invoiced printing allocated to their account. He wants that data in the external accounting system. He can schedule **shared account printing - summary** report to be saved to disk so that he can access the same file periodically and import the data into his external system.*

1. Navigate to the **Scheduled Reports** page.
2. Click **Schedule a new report...** if the panel is not already displayed.
3. Choose the report **Type** of **Shared account printing - summary** .
4. Under **Optional parameters** → **Invoiced**, select, *yes*.

5. Change the report **Format** to **CSV**.
6. Make the report deliverable every week by setting **Report** to **Weekly**.
7. Set the **Delivery** to **To file**.
8. Enter a file name *client-summary*.This will be the name under which file will be saved on the disk.
9. Press **Add**.

Tip

Selecting the option **Append datestamp to file name** is optional. If the option is selected, then the report will be saved with a unique name, including the date every time, otherwise the report will be overwritten periodically.

The report is now scheduled to be written to disk every week, and should now be shown in the table below. John will see a new report being generated under the name of *client-summary.csv*, every week under `[app-path]/server/data/scheduled-reports`.

9.4.2. Details

Each report *Period* determines when the report will run. When the report includes date based usage information (such as printing usage), the period also determines the date range of the data to include.

Period	Report Run Time	Report Date Range
Daily	Early every morning, about 12:55am.	The previous day.
Weekly	Every Sunday in the early morning, about 12:55am.	The previous week, from Sunday to Saturday
Fortnightly	Every second Sunday in the early morning, about 12:55am. Fortnightly reports are run on *even* weeks, i.e. the second week of the year, the fourth week of the year, etc.	The previous fortnight, from two Sundays ago to Saturday.
Monthly	Early morning on the first day of every month, about 12:55am.	The previous month.

Table 9.2. Scheduled reports delivery times

Tip

Reports scheduled to write to a file are always written to a folder on the server located at `[app-path]/server/data/scheduled-reports`. This is a local folder on the server where Print-Limit Pro is installed. It is not possible to change this target location to point to say a network share on another system. The reason for this is that Print-Limit runs as a system service/daemon with limited rights and hence will not have access to other locations/servers. If the file needs to be accessible/consumed from another system, consider sharing the target folder, or using a scheduled task running as a privileged user (e.g. Windows Task or Cron job) to copy the file.

Tip

If a user has their email address set in Print-Limit Pro, their username can be entered in the **Recipients** instead. For example, instead of entering **joe123@domain.org**, entering just **joe** will work.

9.5. Advanced Reporting Options

The following configuration keys can be used to configure report behavior. Configuration keys can be edited at **Options** → **Actions** → **Config editor (advanced)**.

Config name	Description
reports.max-rows	The maximum number of rows that a report will produce. Once the number of rows in a report reaches this value, the data in the report will be cut short (and the report will contain a message to indicate this has happened). This is a 'sanity limit', intended to avoid producing overly large reports by accident. The default value is `10000`.
reports.top-x-rows	The number of rows to display in 'top X' reports, such as the *Largest print users* report. The default value is `100`.
scheduled-reports.day-of-month	The day of the month when the monthly scheduled reports are run. By default, the monthly scheduled reports are set to run on the first day of the month. So, the default value is `1`. The other valid values are between 2 to 28.
reports.csv-display-comment-headers	Determines whether to display the comment headers in CSV reports (e.g. The report name and report parameters in the first few rows of the file). It may be appropriate to remove the headers if the CSV files are to be post processed or imported into a 3rd party system such as an accounts database. To display comment headers set the value to `Y`, to hide set the value to `N`.

Table 9.3. Advanced Reporting Config Keys

Please see Section 12.9, “Using the Config Editor” to find out how to change config keys.

Chapter 10. Hold/Release Queues & Print Release Stations

In a standard network printing environment, when a user prints from an application, the job is sent directly to the printer and starts printing immediately. In some environments it may be advantageous to place the job in a holding state prior to printing. Some common examples include:

- *Secure Printing* - In a secure printing environment jobs are only printed when the user arrives at the print area and confirms his or her identity. This ensures the user is there to collect the job and other users can't "accidentally" collect the document.
- *Approved Printing* - In some organizations it may be appropriate to hold jobs until they are approved by selected individuals. A good example would be a teacher approving printing on an expensive color printer.
- *Authentication* - Hold/Release queues can be used as a form of authentication in an unauthenticated environment. Users must authenticate prior to releasing their jobs allowing Print-Limit Pro to confirm their identity.

Print-Limit Pro provides the framework and software interface to implement hold and release queues.

Users can interact with the *Hold/Release Queues* (e.g. release their jobs) in a number of ways. This normally takes the form of a *Release Station* - a dedicated computer terminal located next to the printers, however other interaction methods include access via a browser-based interface. Hold/Release Queues are used for a wide variety of purposes depending on the requirements of the organization. This section outlines a number of these scenarios, and also how to install and configure the release interface.

The simplest way to get started with hold/release queues is to read through the scenarios below (see Section 10.2, “Hold/Release Usage Scenarios”), and decide which best suits your needs. These scenarios will outline the steps required to configure and manage a queue.

Tip

Hold/release queues may be used to implement a *find me printing* environment. See Chapter 11, *Find Me Printing and Printer Load Balancing* for details.

10.1. Release Station Interfaces

Print-Limit Pro includes four different interfaces to manage hold/release queues. Three of these are variations of a web-based interface and one is a software version that is typically used for dedicated release stations. These interfaces are described below.

10.1.1. Standard Release Station

The standard release station is typically used on dedicated workstations located near-by the printers. It usually runs in a full-screen mode that cannot be exited. The release station can be run in a number of modes that changes its behavior depending on your needs. These modes are described in Section 10.3.3.1, “Release Station Modes”.

For more information regarding deployment of the Standard Release Station see the `[app-path]\release\README.txt` file. For information regarding configuration of the Standard Release Station see Section 10.3.3, “Standard Release Station Configuration”.

The release station scenarios below describe which mode to use for different situations.

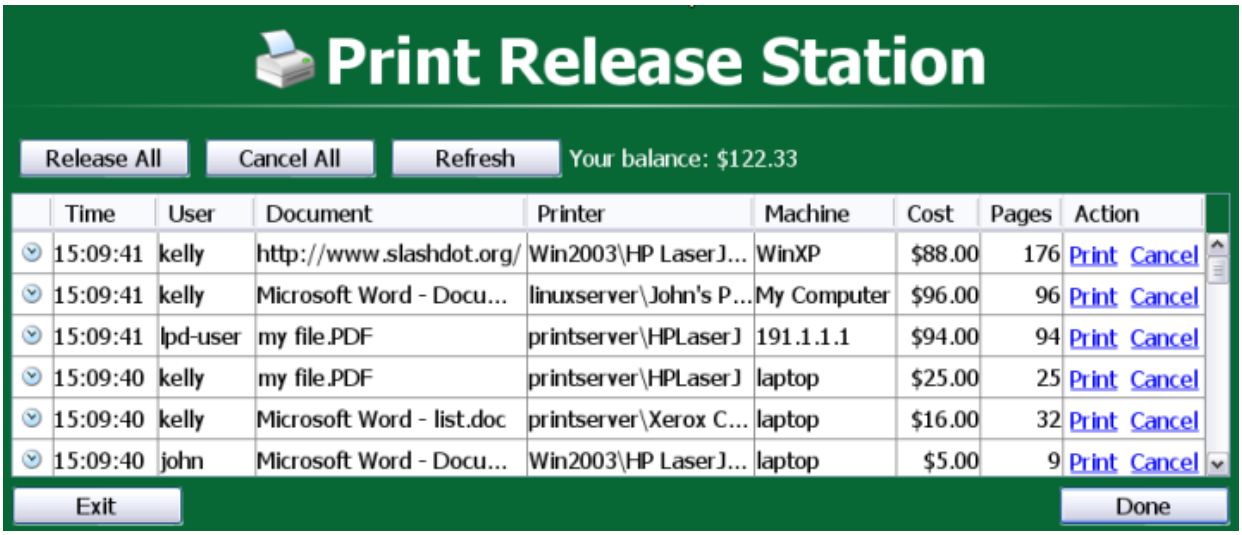

Print Release Station
Release All
Cancel All
Refresh
Your balance: $122.33
Time User Document Printer Machine Cost Pages Action
15:09:41 kelly http://www.slashdot.org/ Win2003\HP LaserJ... WinXP $88.00 176 Print Cancel
15:09:41 kelly Microsoft Word - Docu... linuxserver\John's P... My Computer $96.00 96 Print Cancel
15:09:41 lpd-user my file.PDF printserver\HPLaserJ 191.1.1.1 $94.00 94 Print Cancel
15:09:40 kelly my file.PDF printserver\HPLaserJ laptop $25.00 25 Print Cancel
15:09:40 kelly Microsoft Word - list.doc printserver\Xerox C... laptop $16.00 32 Print Cancel
15:09:40 john Microsoft Word - Docu... Win2003\HP LaserJ... laptop $5.00 9 Print Cancel
Exit
Done

Figure 10.1. The Standard Release Station

Tip

To educate users about printing using a release station, administrators might find the sample information sheet helpful.

10.1.2. Manager-mode web-based release station

The manager-mode web-based release station provides functionality equivalent to the standard release station running in "Manager mode". However, the web-based release station may be more convenient because it can be run from anywhere using a web browser. It allows release managers and Print-Limit administrators to manage held jobs and release or cancel jobs printed by any user.

The web-based release station can be access by visiting the following URL, and logging in as a user with `admin` or release station manager permissions.

```
http://[servername]:9191/release
```

where [servername] is the name of the Print-Limit Pro server. To make a user a hold/release queue manager see Section 10.3.2, “Hold/Release Queue Managers”.

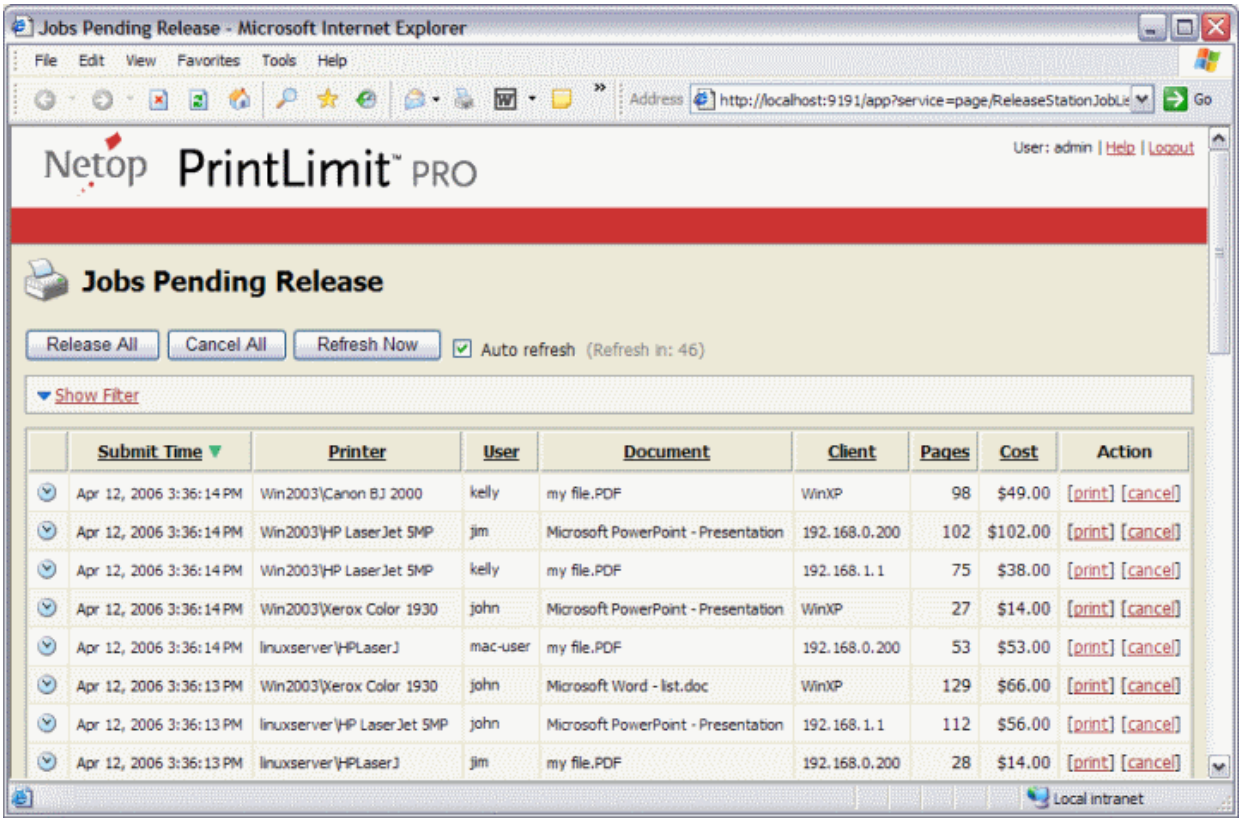

Jobs Pending Release - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://localhost:9191/app?service=page/ReleaseStationJobLi
Go
Netop PrintLimit PRO
User: admin | Help | Logout
Jobs Pending Release
Release All
Cancel All
Refresh Now
Auto refresh (Refresh in: 46)
Show Filter
Submit Time
Printer
User
Document
Client
Pages
Cost
Action
Apr 12, 2006 3:36:14 PM Win2003\Canon BJ 2000 kelly my file.PDF WinXP 98 $49.00 [print] [cancel]
Apr 12, 2006 3:36:14 PM Win2003\HP LaserJet 5MP jim Microsoft PowerPoint - Presentation 192.168.0.200 102 $102.00 [print] [cancel]
Apr 12, 2006 3:36:14 PM Win2003\HP LaserJet 5MP kelly my file.PDF 192.168.1.1 75 $38.00 [print] [cancel]
Apr 12, 2006 3:36:14 PM Win2003\Xerox Color 1930 john Microsoft PowerPoint - Presentation WinXP 27 $14.00 [print] [cancel]
Apr 12, 2006 3:36:14 PM linuxserver\HPLaserJ mac-user my file.PDF 192.168.0.200 53 $53.00 [print] [cancel]
Apr 12, 2006 3:36:13 PM Win2003\Xerox Color 1930 john Microsoft Word - list.doc WinXP 129 $66.00 [print] [cancel]
Apr 12, 2006 3:36:13 PM linuxserver\HP LaserJet 5MP john Microsoft PowerPoint - Presentation 192.168.1.1 112 $56.00 [print] [cancel]
Apr 12, 2006 3:36:13 PM linuxserver\HPLaserJ jim my file.PDF 192.168.0.200 28 $14.00 [print] [cancel]
Local intranet

Figure 10.2. Manager-mode web-based release station

10.1.3. Web-based release station within the admin pages

When logged into the admin pages, an administrator can view all jobs held by release stations by:

- Navigating to the **Printers** section.
- Selecting the **Jobs pending release** tab.

This interface is identical to the full-screen web-based release station, but can be more convenient for users already logged into the administration pages.

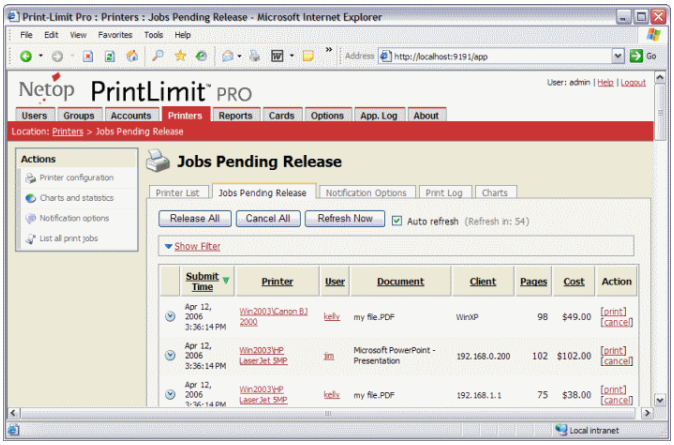

Print-Limit Pro : Printers : Jobs Pending Release - Microsoft Internet Explorer
Netop PrintLimit PRO
User: admin | Help | Logout
Users Groups Accounts Printers Reports Cards Options App. Log About
Location: Printers > Jobs Pending Release
Actions
Printer configuration
Charts and statistics
Notification options
List all print jobs
Jobs Pending Release
Printer List Jobs Pending Release Notification Options Print Log Charts
Release All Cancel All Refresh Now Auto refresh (Refresh in: 54)
Show Filter
Submit Time Printer User Document Client Pages Cost Action
Local intranet

Figure 10.3. Web-based release station within the admin pages

10.1.4. End-user web-based release station

When end-users are logged into the user web interface, they can view their print jobs that are currently held pending release. The administrator can decide whether this interface is visible to end users, and which type of jobs a user may release. More information can be found at Section 10.3.4, “End-User Web Based Release Interface Configuration”.

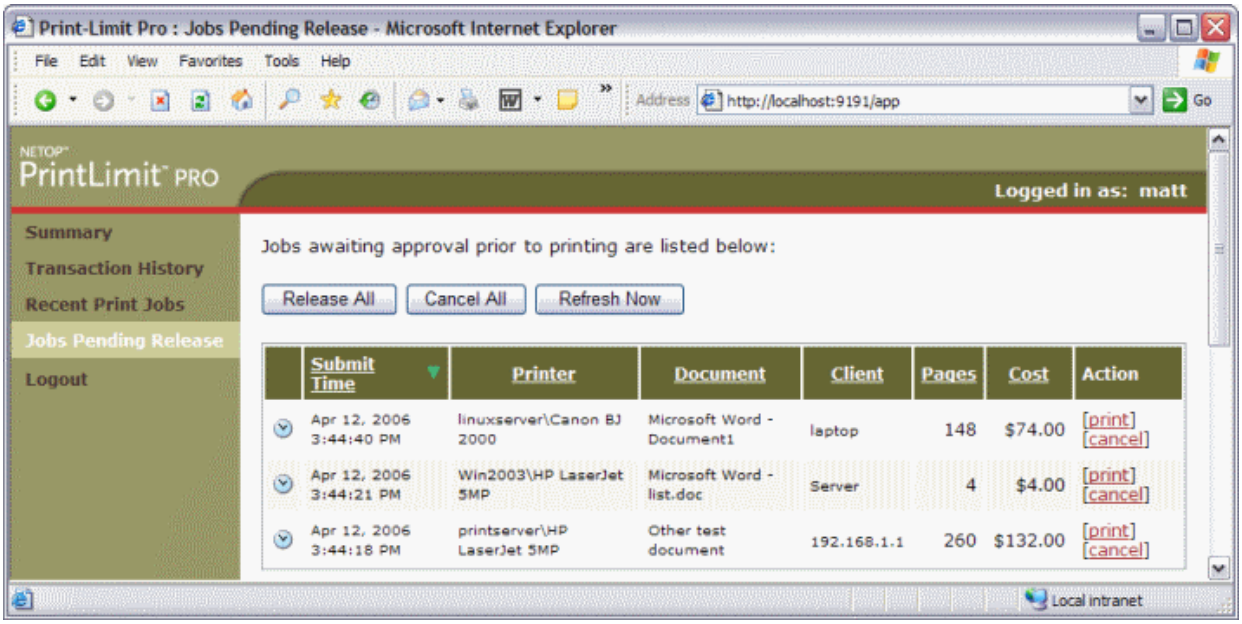


Figure 10.4. End-user web-based interface listing held jobs

10.2. Hold/Release Usage Scenarios

This section describes various usage scenarios discussing why and how to use a hold/release queue. They provide a good starting point for your own implementations.

10.2.1. Saving paper and toner

A large source of wasted paper in organizations are documents that were never collected from the printer. Some of these uncollected documents are caused by accidental printing, and others were just forgotten. But the majority of these documents end up in the bin.

If the document is not printed until a user walks to the printer to collect it, then this source of waste can be mostly eliminated.

To implement a release station to save paper:

- Set up a low-end workstation near the printer(s).
- Run the Standard Release Station in the default mode (Release Any mode). More information can be found at Section 10.3.3.1, “Release Station Modes”.
- In Print-Limit Pro, enable the printer(s) for release station use. More information can be found at Section 10.3.1, “Enabling hold/release support on a printer”.
- To allow users to release jobs via the end-user web based release station, also enable Release Any mode for the web tools interface. More information can be found at Section 10.3.4, “End-User Web Based Release Interface Configuration”.

10.2.2. Secure Printing

When users print documents that contain sensitive information, it is important that no one else picks up the document from the printer. Even when the printers are close-by, people can be distracted and accidentally leave sensitive documents on the printer. Print release stations can be used to implement Secure Printing, which ensures that a document can only be released by the person who printed it and only when that person is standing near the printers.

Secure printing is implemented as follows:

- Setup a low-end workstation near the printer(s).
- Run the Standard Release Station in "Secure" mode. More information can be found at Section 10.3.3.1, “Release Station Modes”.
- In Print-Limit Pro, enable the printer(s) for release station use. More information can be found at Section 10.3.1, “Enabling hold/release support on a printer”.

Secure printing requires users to be authenticated on the network when printing (i.e. an Active Directory domain). This allows the release station to enforce the secure printing so that users can only release documents they print.

Tip

It is sometimes useful to allow a user to release jobs printed by another user. For example a personal assistant should be able to release both their own jobs and the jobs printed by their manager. This is configured by setting the user-level option **Allow this user to release jobs printed by** (find it in the **Advanced Options** section).

10.2.3. Pay per print (e.g. Library or Internet Cafe)

Libraries and Internet cafes usually only allow printing once a user has paid for the cost of the printed document. Previously, implementing pay-per-print often involved deploying expensive card-based payment solutions, however Print-Limit Pro release stations allow this to implemented in a more cost effective way.

An example of how print release stations would be used in this scenario is:

1. Users print documents from a workstation without any assistance from staff.
2. The printed documents will be held in the queue until released by a staff member.
3. The user goes to the staff desk and asks for the document to be released.
4. The staff member opens a release station (the program or a web page), finds the user's job, notes the cost and collects the payment from the user.
5. The staff member presses the "Print" button, allowing the job to be printed.
6. The user then collects the printed document from the printer.

If the user never pays for a print then the print job will be automatically deleted without any staff interaction.

To implement a pay-per-print hold/release queue:

- In Print-Limit Pro, enable the hold/release option on the printer(s). See Section 10.3.1, “Enabling hold/release support on a printer”.
- In Print-Limit Pro, setup the staff to be a "hold/release queue manager". This will allow them to log in to the "manager mode" release stations. See Section 10.3.2, “Hold/Release Queue Managers”.
- On the staff desk workstations, run the release station in "Manager mode". See Section 10.3.3.1, “Release Station Modes”.
- There are two release interfaces to choose from:

- Standard Release Station in "Manager mode" - requires minimal setup.
- Web-based release interface - requires only a web browser.

10.2.4. Expensive Printers (Approved Printing)

At times it is necessary to restrict access to an expensive printer (like a color laser printer), or other printer that should only be used with an administrator's permission. Instead of locking the printer away where no one has access to it; the printer can be configured so that only administrators or hold/release managers can release print jobs. In this situation:

1. The user prints the document to the restricted printer.
2. The document is held in the queue awaiting approval by an authorized person.
3. The user talks to the administrator (or approved user) who would decide whether the user should be allowed to perform the print.
4. The administrator logs into the web-based release interface from any machine on the network, and "Release" or "Cancel" the job as appropriate.

To implement admin/manager only release interface:

- In Print-Limit Pro, enable the hold/release mode on the printer(s), and select the "Admin/Manager only release" mode. See Section 10.3.1, “Enabling hold/release support on a printer” for more info.
- It is not necessary to set up a dedicated release station near the printer, because the web-based release interface can be used from any machine on the network.
- It is also a good idea to put a notice on the printer that tells users how to have their documents released.

10.2.5. Unauthenticated printing

In some environments it is not possible (or very difficult) to have users authenticated when printing. This could be due to a technology constraint (like using Macs in mainly Windows environment) or could be for convenience (like having kiosk computers in the library that people can use without logging in).

In these scenarios, print jobs are printed under one name, but charging should be allocated to another. For example, a job is printed by an generic "library user", but there is a need to charge to the user's real account. In order to charge the correct user for printing, Print-Limit Pro needs to identify the user to charge, and this can be achieved by using a release station in "Release Any" mode.

This works as follows:

1. The user prints from a workstation but is not authenticated, so jobs are allocated to a generic user.
2. The print job is held in the queue awaiting release.
3. The user walks to the release station and enters a username and password. Alternatively the user may log into the Print-Limit Pro web interface and select **Jobs Pending Release**.
4. All jobs held are listed. Jobs can be identified by document name or workstation machine name.
5. The user selects his or her jobs. Any jobs released are charged to that user's account.

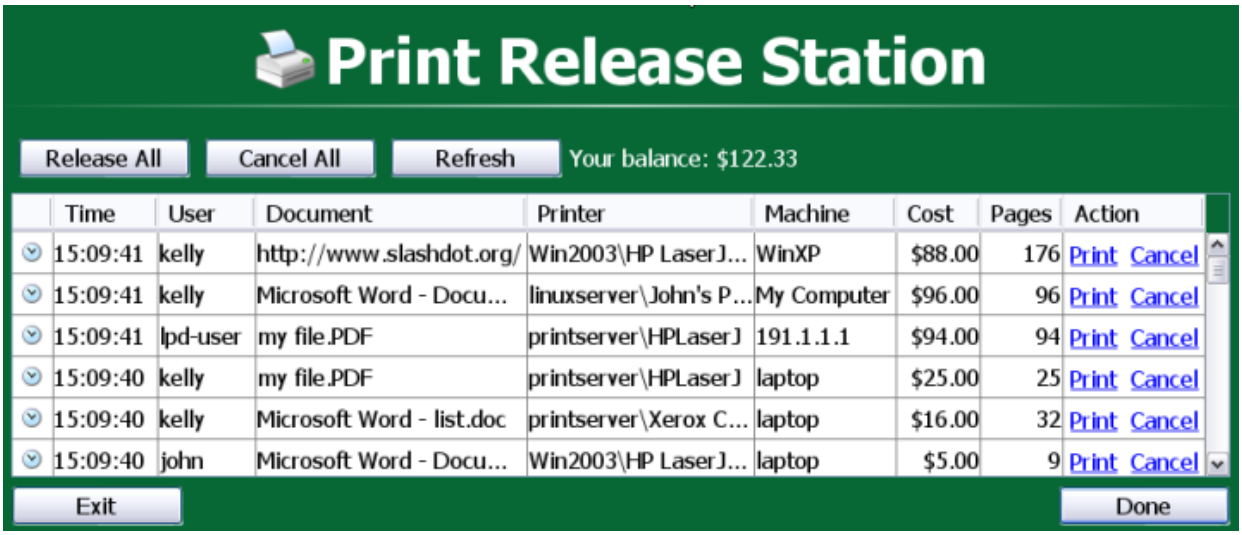

Print Release Station
Release All
Cancel All
Refresh
Your balance: $122.33
Time User Document Printer Machine Cost Pages Action
15:09:41 kelly http://www.slashdot.org/ Win2003\HP LaserJ... WinXP $88.00 176 Print Cancel
15:09:41 kelly Microsoft Word - Docu... linuxserver\John's P... My Computer $96.00 96 Print Cancel
15:09:41 lpd-user my file.PDF printserver\HPLaserJ 191.1.1.1 $94.00 94 Print Cancel
15:09:40 kelly my file.PDF printserver\HPLaserJ laptop $25.00 25 Print Cancel
15:09:40 kelly Microsoft Word - list.doc printserver\Xerox C... laptop $16.00 32 Print Cancel
15:09:40 john Microsoft Word - Docu... Win2003\HP LaserJ... laptop $5.00 9 Print Cancel
Exit
Done

Figure 10.5. All documents easily identifiable by document and machine name

To implement unauthenticated printing using a release station:

- Set up a low-end workstation near the printer(s).
- Run the Standard Release Station in "Release Any" mode. See Section 10.3.3.1, “Release Station Modes”.
- In Print-Limit Pro, enable the printer(s) for release station use, and select the "User release" mode. See Section 10.3.1, “Enabling hold/release support on a printer”.
- To allow users to release jobs via the end-user web based release interface, also enable Release Any mode for the web tools interface. More information can be found at Section 10.3.4, “End-User Web Based Release Interface Configuration”.

To implement unauthenticated printing using the browser interface:

- In Print-Limit Pro, enable the **Hold/Release** mode on the appropriate printer(s). See Section 10.3.1, “Enabling hold/release support on a printer”.
- Ensure end-users have the ability to view held jobs and can **release any job (charging to their account)**. More information can be found at Section 10.3.4, “End-User Web Based Release Interface Configuration”.

10.3. Release Station Configuration

This section describes various aspects to configuring release stations.

Some additional installation notes can also be found in the release station README file located here:

```
[app-path]\release\README.txt
```

10.3.1. Enabling hold/release support on a printer

By default, print jobs will be sent directly to the printer and will not be held. To turn on hold/release support on a given printer:

1. Log on to the administration section.
2. Navigate to the **Printers** section.

3. Select the printer.
4. Select the option to **Enable hold/release queue**.
5. Choose the appropriate release mode for your needs.

The two release modes available are:

- User Release - this is the standard mode that allows users to release and view only the jobs printed under their name/user account.
- Admin/Manager only release - in this mode, jobs can only be released by administrators or hold/release queue managers.

Tip

To configure multiple printers with hold/release queue support, the **Copy settings to other printers** function can be used. To use this, configure one printer as required, press the **Copy settings to other printers** and select the printers to copy the settings to.

10.3.2. Hold/Release Queue Managers

A hold/release queue manager is a user that has additional privileges to manage release stations and jobs held in hold release queues. Managers can:

- Log on to the "manager mode" release stations (both the software and web-based release station).
- Log on to the "secure mode" release stations which switches them into manager mode so that users' print jobs can be released.
- Release jobs that can only be released by managers or administrators.
- Can close the Standard Release Station when running in full-screen mode.

To make a user or group a hold/release queue manager:

1. Log on to the administration pages.
2. Navigate to the **Options** → **Admin Rights**.
3. Add a user or group as an administrator.
4. To restrict their access to only the release station interface and deselect all the other admin rights.
5. Click on the **Apply** button to save the changes.

To get more information about assigning admin rights see Section 12.4, “Assigning Administrator Level Access”.

It is also possible to make a user a hold/release queue manager by following the steps below:

1. Log on to the administration pages.
2. Navigate to the **Options** section.
3. Find the **Release Station security** section.
4. Enter user's username in **Hold/Release Queue Managers** field. To enter multiple users, separate usernames with a comma (`,`).

10.3.3. Standard Release Station Configuration

The Standard Release Station is configured using a configuration file located in the directory where the release station executables are located. The default configuration file is:

```
[app-path]\release\config.properties
```

This configuration file allows you to configure the behavior and look of the release station in a number of ways. Each of the configuration items are described in the table below:

Config name	Description
mode	The mode changes the behavior of the release station depending on the need. The available modes are described in Section 10.3.3.1, “Release Station Modes”.
use-username-authentication	(Y/N) - Enable username authentication. Users will be required to enter their domain username to log into the release station. They may also be required to enter their password, depending on the 'mode' setting. Default: Y (Yes).
use-card-authentication	(Y/N) - Enable card-based authentication. This is designed for use with dedicated hardware card readers. The card number is validated against the user's card-number field. Default: N (No).
show-jobs-from-queues	Filters the list of jobs to only those print queues listed. This is a comma separated list of full printer names (i.e. server\printer). This is useful when there are multiple release stations, each managing the queues of a different set of printers.
releases-on	This option applies to installations using *Find Me Printing* and sets the behavior of jobs released from a virtual queue. For more information see Chapter 11, *Find Me Printing and Printer Load Balancing*. This setting defines the printer (or list of printers) that the jobs should be printed to when released. This is usually the printer(s) in close proximity to this release station.
confirm-printing	When enabled (Y) and users release a job that is charged to their personal account, a confirmation dialog is displayed to confirm that the user wants to print and be charged for the job. When disabled (N) the confirmation dialog is never displayed.
display-columns	Used to customize the columns displayed and the order they appear in the list of print jobs. The default value is: date,user,printer,document,machine,pages,cost
display-column-widths	Used to customize the width of columns displayed. The setting can only be used if the `display-columns` is defined. The number of values must match the number of values in the `display-columns` setting. The default value is: 8,12,25,30,15,8,8
hide-printer-server-names	(Y/N) - Used to hide the printer server names from the list of print jobs. Default: N (No)
show-print-all	(Y/N) - Indicates whether the **Print All** button should be displayed. Default: Y (Yes)
show-cancel-all	(Y/N) - Indicates whether the **Cancel All** button should be displayed. Default: Y (Yes)
max-idle-secs	The number of seconds without user input, before the user is logged out of the release station. The default is 30 seconds.
background-color	Allows for customizing the background color of the release station to match the organization's colors. The color format is the hexadecimal color code used in HTML - #RRGGBB (where RR is the red component, GG is the green component and BB is the blue component).
font-color	Allows for customizing the font/foreground color used in the release station. The color format is the hexadecimal color code used in HTML.
locale	Allows to override the default language used for the release station. The value is a valid ISO language code. E.g. en, zh_HK.
title	The title that appears at the top of the release station screen.
instructions	The instructions to display at the login page. A can be included to start a new line.

Config name	Description
card-and-username-instructions	The instruction text that appears when using both card authentication and username authentication, appearing in-between the card entry and username entry fields. A can be included to start a new line.
logo-image	Allows a custom logo image to be displayed. For best results the image should be between 50 and 80 pixels in height. PNG, JPG or GIF images are allowed.
scale-factor	Allows to adjust the size of text displayed in the release station. Higher value increases the text size. Larger text may be preferable on high resolution screens or touch screens. The default is 1.5.
release-cancel-gui-style	Allows to set the GUI style of the release station actions. The valid styles are `link` and `button`. Setting it to `button` is useful when running release station on touch screens. The default is `link`.

Table 10.1. Standard Release Station config settings

Tip

When running release stations from the `\\server\PCRelease` share, each workstation can have its own configuration file. The "config.properties" is used for default settings for all release stations, but settings can be overridden by defining another configuration file for each release station. These files should be put in the same directory and be named using the following convention:

```
config.[machine-name].properties
```

where [machine-name] is the name of the machine running the release station.

Apple OSX servers may require the use of the fully qualified domain name of the machine running the release station rather than the short name.

A custom configuration file may also be specified as a startup command-line option using the following syntax:

```
pc-release.exe --config "[config file path]"
```

10.3.3.1. Release Station Modes

The release station modes available are described below. The release station mode is changed in the configuration file as described in Section 10.3.3, “Standard Release Station Configuration”.

Mode	Description
ReleaseAny	This is the default mode. It allows a user who logs onto the release station to release any held jobs. Any jobs released will be charged to the logged in user.
Manager	Manager mode allows only administrators or hold/release queue managers to log in to the release station. In release station mode, all jobs are listed and users are not automatically logged out due to inactivity.
Secure	Secure mode allows users to only see and release print jobs that they have printed. Release station managers can see and release all users' print jobs.
NoPassword	This works similar to the secure mode, however users don't need to enter the password to view jobs.

Table 10.2. Standard Release Station modes

In all modes except Manager mode, users are logged out automatically after a period of inactivity defined in the configuration file, the default being 30 seconds.

10.3.3.2. Card-based User Authentication

In some environments, users are issued with identity cards that can be used for authentication. The cards might be used to gain entry to buildings, or borrow from a library. The cards can also be used to authenticate users at the standard release station. Using a card is often much more convenient and less error-prone than entering a username and password.

To use card-based authentication an appropriate hardware card-reader is required. The card reader must be connected to the machine running the release station and act like a keyboard. i.e. when the user swipes/scans their card, the card reader outputs the digits just as if someone entered them using the keyboard. There are card readers that can do this for all commonly used card types (e.g. magneetic stripe, barcode, etc). An easy way to test a card reader is to open a text editor and place the cursor in a new text document. Then when a card is swiped the card number will appear in the text file.

The card numbers entered at the release station are validated against the **Card/Id number** field for the user. This can be found at the bottom of the user details screen in the admin interface. Before card authentication can be used, the users' card numbers must be associated with the user record in Print-Limit Pro. The numbers can be entered manually, automatically synchronized from Active Directory or LDAP (see Section 12.3.6, “Importing Card/Identity numbers from Active Directory or LDAP”) or imported in bulk using the Batch User Import file (see Section 6.6, “Batch User Data Import and Update”).

Once card numbers are associated with users, the card-based authentication can be enabled in the release station by setting the `use-card-authentication` to `Y` in the release station's `config.properties` file. Once the release station is restarted it will be in card-authentication mode, and can be tested by swiping a card through the card-reader.

The `config.properties` file has some other settings to change how the card-number is read from the reader. For example, you can change the header and trailer characters used by some card readers to indicate the start and end of the card number. See the config file for details.

10.3.3.3. Friendly client machine aliases

In some environments (for example public libraries), it can be important for users to identify print jobs by the client machine they were printed from. By default, the release station will list the either the IP address or the machine's unique network name Neither of these are helpful to release station users. To avoid this problem the administrator can define a list of aliases, that map the unfriendly names to a more user-friendly name.

For example, print jobs might appear in the release station as `192.168.1.100` or `winpc0076`, but would be more meaningful for the user to appear as `Public PC 1`.

These aliases are defined in the `[app-path]/release/client-machine-aliases.properties` file. The entries are in the format:

```
[machine]=[alias]
```

It is also valid to have multiple entries that map to the same alias. So to add aliases for the example above the following lines would be added to the `client-machine-aliases.properties` file:

```
192.168.1.100=Public PC 1
winpc0076=Public PC 1
```

10.3.3.4. Job timeout

If a user does not release their held job after a defined time, their job will be automatically deleted. This is to prevent

a buildup of old/abandoned jobs in the hold/release queue. The default timeout is `30` minutes, and can be changed as follows:

1. Navigate to **Options** → **General** → **Hold/Release Queues** and find the option **Delete held jobs if not released after**.
2. Enter the number of minutes to wait for users to release their job before it is deleted.
3. Press **Apply**

10.3.4. End-User Web Based Release Interface Configuration

Configuration options for the end-user web based release interface can be found in the administrative interface at **Options** → **General** → **User Features**. These options control the availability of the **Jobs Pending Release** option available to end users. The available options are:

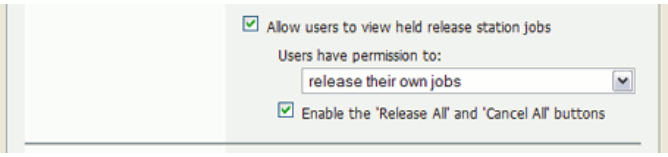

Allow users to view held release station jobs
Users have permission to:
release their own jobs
Enable the 'Release All' and 'Cancel All' buttons

Figure 10.6. End-user web based release interface options

- *Allow users to view held jobs* - this option enables the **Jobs Pending Release** screen in the user web tools. When this option is disabled, no related functionality is available from the user web tools interface.
- *Users have permission to:* - this option changes which type of jobs users can see and/or release. The available options are:
  - **view their own jobs only** - users may see their own jobs that are held in the hold/release queue. Jobs printed by other users are not displayed. They may cancel their own jobs, but cannot release them. This is useful if users are required to be physically at the printer to release a job, where a standard release station is running.
  - **release their own jobs** - users may release or cancel their own jobs. Jobs printed by other users are not displayed.
  - **release any jobs (charged to their account)** - users may release or cancel any job that is being held, including jobs from other users. If a user releases a job that was sent by a different user, the releasing user is charged for the job. This option is equivalent to the `Release Any` mode used in Release Station and is ideal for authenticating printing in a unauthenticated environment.
- *Enable the 'Release All' and 'Cancel All' buttons* - enabling this option allows users to release or cancel all held jobs by clicking one button. When this option is disabled, users must release or cancel jobs individually.

  This option is purely for the convenience of the users. It can save a user a few clicks when they want to release all their jobs at once. However if the user is able to release jobs other than their own, a user might accidentally release (and be charged for) many other users' jobs.

Chapter 11. Find Me Printing and Printer Load Balancing

This chapter covers two advanced concepts: printer load balancing and "find me" printing.

- *Find Me Printing* - solves the problem of finding the closest printer from a long list of available printers. It is a roaming print service that allows print jobs to find users based on their physical location. It's sometimes referred to as "Pull Printing", "Push Printing" or "Follow Me" printing.
- *Printer Load Balancing* - covers the act of automatically distributing print load between multiple physical printers.

These are two advanced features pertinent to large sites with a large number of printers. These topics are addressed together in this chapter as they both involve the concept of *print job redirection*, where a job is taken from one queue and transferred to another.

The topics covered in this chapter are advanced in nature and targeted towards the administrator who is already comfortable with Print-Limit Pro and print queue configuration. If implementing Print-Limit Pro for the first time it is recommended to plan a simple configuration in the first phase, then return to implement find me printing or load balancing in a later phase once users and administrators are comfortable with the basic features.

11.1. Find Me Printing

Find Me Printing is best described not by what it does but by the problem it solves. Consider a large organization with hundreds of printers. The task of selecting the "best" printer from the list at the time of print can be daunting. Organizations tend to mitigate this concern using a number of methods:

- *Naming Conventions* - network administrators will adopt a printer naming convention that helps users locate the best printer. A common convention is to use the room name or floor number. This is usually complemented by a sign on the printer itself.
- *Location Adaptive Login Scripts* - in many respects a location adaptive login scripts is a most elegant solution. The login script automatically adds the printers to the workstation based on the workstation's physical location (denoted by the computer name). For example, any workstation containing "lvl2" in the name will have the two printers on Level-2 by default. Users will only need to consult the full list of printers in the rare occasion that they wish to print to a printer outside their physical level/room.
- *Global Profile* - administrators map the "best" printer based on location globally on the workstation (e.g. using `rundll32 printui.dll,PrintUIEntry /ga /n\\server\printer` on Windows). Any user that logs on to the workstation will have the most appropriate printer selected by default.

All these methods have their drawbacks and require careful planning on the part of administrators, and the need for end-users to understand conventions/processes. *Find Me Printing* solves the problem by "asking the job to find the user, rather than having the user find the printer". It works as follows:

1. The user prints to a single site-wide global queue.
2. The user then walks up to a Release Station logs in, locates their job and releases it.
3. The job will then proceed to automatically print to the closest physical printer.

Find Me Printing is referred to by users as other terms such as *Follow-me printing* (because print jobs follow you to a printer), *Pull Printing* (because the job is pulled from the global queue) or *Push Printing* (because the release station pushes the job to the nearest printer).

Before implementing a Find Me Printing scenario, the administrator should be familiar with release stations (see Chapter 10, *Hold/Release Queues & Print Release Stations*). Administrators will also need to consider and plan hardware and driver compatibility. Find Me Printing works by re-directing a job targeted at one queue to another and hence printer compatibility is important. For example, a job designed to print on an inkjet photo printer will not usually be suitable for printing on a laser printer. The topic of printer/driver compatibility is discussed in detail in the section proceeding the examples below.

11.1.1. Implementation by Example

Implementing *Find Me Printing* is best described by way of example. The following sections cover some common scenarios for implementing Find Me Printing.

11.1.1.1. Example 1: Single Virtual Queue (High School)

11.1.1.1.1. Scenario

East Beach High School has seven high volume laser printers of the same model at various locations throughout the campus. When sending a print job students must currently select the printer nearest to them before retrieving the document. Students often send jobs to the wrong queue and rather than going to pick it up they re-send the document to a closer queue and leave the original document uncollected.

The current print queues are named `laser-1` through `laser-7` with the number corresponding to a label on the printer. All printers are hosted on the print server called `print-server`. All printers are the same make and model (using the same driver).

In the library there are two printers, `laser-6` and `laser-7`, side by side.

The goal is to implement one central queue to receive all print jobs. A release station will be set up next to each printer. Each release station will allow users to have their job printed at the nearby printer.

11.1.1.1.2. Implementation

The first step is to create a new print queue on the print server. This queue will be a *virtual queue* with *hold/release* enabled. When students print to the virtual queue their job will be held, and the release station the user releases the job at will determine to which printer the job is sent (the job is pulled from the virtual queue to a printer near the user).

A new queue will be called `find-me-queue` is created by the administrator on `print-server` using the normal methods for the operating system in use. The queue is created using the same driver that `laser-1` through `laser-7` use. The queue points to the IP address of one of the printers - this is not strictly necessary as the "virtual queue" is just a *collecting queue* that forwards jobs to real queues, however some printer drivers "complain" if they do not point to a real printer.

The administrator ensures that the print queue has registered itself with Print-Limit Pro by checking the **Printers** tab of the administration interface. Information about adding printers can be found in Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

After creating of the new virtual queue the administrator performs the following:

1. Navigates to **Printers** → **find-me-queue** → **Summary** in the Print-Limit Pro administration interface.
2. Changes the **Queue type** option to **This is a virtual queue (jobs will be forwarded to a different queue)**. This reveals the **Job Redirection Settings** section.
3. The option **Jobs may be forwarded to these queues:** determines which queues `find-me-queue` is capable of redirecting to. The queues `print-server\laser-1` through `print-server\laser-7` are selected.
4. Enables the option **Enable hold/release queue** and sets **Release mode** to **User release** (the default). This ensures that jobs are held in the virtual queue and not automatically forwarded to one of the targets.
5. Clicks **OK**.

The next step is to configure the release stations:

1. The administrator first configures each release station as per Section 10.3, “Release Station Configuration”. The administrator decides that students should only be able to see and release the jobs they have personally printed, so sets up the release station in *Secure* mode.
2. Each release station should be configured to release jobs on the printer it is associated with by setting the `releases-on` option in the release station config file. E.g. for the release station set up near the printer `laser-4`, the option should be set to:

```
releases-on=print-server\\laser-4
```

In the library (where there are two printers side by side) the administrator configures a single release station to release to either printer by setting the option to:

```
releases-on=print-server\\laser-6,print-server\\laser-7
```

In this case when a user releases a job at the library release station Print-Limit Pro will select either `laser-6` or `laser-7` based on a load balancing algorithm (see Section 11.4.1, “Example 1: Simple Load Balancing”).

Now when students print from a lab computer to the virtual `find-me-queue` queue their job will be held. The student can visit any release station and see their job. When the student releases their job at a release station the job will be pulled from the virtual queue into the queue or queues associated with the release station for printing. This setup is illustrated in Figure 11.1, “Single Virtual Queue (High School)”. Administrators should also ensure that the `find-me-queue` queue is set as the default queue on all workstations.

The administrator may now optionally un-share all but the virtual queue. This would enforce that users use the "find me" process rather than printing directly to one of the target printers.

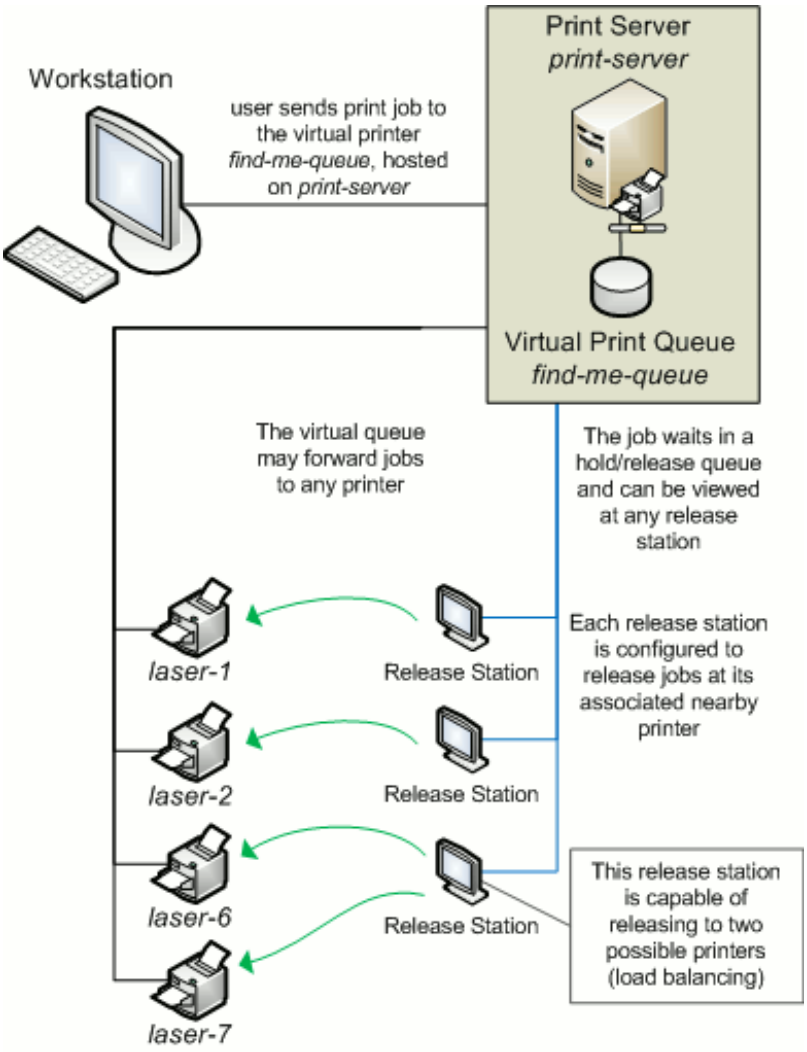

Print Server
print-server
Workstation
user sends print job to the virtual printer find-me-queue, hosted on print-server
Virtual Print Queue
find-me-queue
The virtual queue may forward jobs to any printer
The job waits in a hold/release queue and can be viewed at any release station
Each release station is configured to release jobs at its associated nearby printer
laser-1
Release Station
laser-2
Release Station
laser-6
Release Station
laser-7
This release station is capable of releasing to two possible printers (load balancing)

Figure 11.1. Single Virtual Queue (High School)

11.1.1.2. Example 2: Multiple Virtual Queues (Different Printer Types)

11.1.1.2.1. Scenario

West Face University has a Graphic Design department who use two wide format plotters and seven color laser printers. The two plotters and two of the laser printers are located in the department print room, while the other laser printers are scattered around various locations. The plan is to add more printers next year.

The two wide format plotter queues are named `wf-plotter-1` and `wf-plotter-2`, and the color laser printers are named `color-laser-1` through `color-laser-7`. Laser `1` and `2` are located in the print room with the plotters.

The goals of the project are:

- *Implement Find Me Printing* so users don't need to remember the names associated with the ever growing list of printers.
- Implement release stations. This will ensure the student/staff member is there to collect their work minimizing the chance of one person accidently collecting another's work.

- Ensure the procedure is similar for all types of printers, meaning users only have to learn one process.
- Automatic load balancing in the print room to ensure all printers receive an equal load and throughput is maximized.

11.1.1.2.2. Implementation

This implementation differs from the previous implementation in that we have two distinct printer types. It is not technically possible to have one "find-me-queue" as jobs rendered by the application for the wide-format printer can't be printed on a laser printer and vice versa. See Section 11.2, “Requirements For Job Redirection (Load Balancing or Find Me Printing)” for more discussion on compatibility.

The first step is to create a new print queue for each printer type on the print server. These queues will be *virtual queues* with *hold/release* enabled. When a student prints to a virtual queue their job will be held at displayed at the release station. When a student releases their job, Print-Limit Pro knows which target queues are compatible (based on configuration) and selects one of the available target queues using an intelligent load balancing algorithm.

Two new queues called `wf-plotter` and `color-laser` respectively are created by the administrator on the print server `graphics-print`. `wf-plotter` is created using the same driver as the existing queues `wf-plotter-1` and `wf-plotter-2`, and likewise `color-laser` uses the same driver as its counterparts. Both new queues point to any physical device of the same type, e.g. `wf-plotter` to `wf-plotter-1`. This last point is not strictly necessary but some printer drivers complain if they do not point to a real printer.

The administrator ensures that both print queues have registered themselves with Print-Limit Pro by checking the **Printers** tab of the administration interface. Information about adding printers can be found in Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

Following creation of the new queues the administrator performs the following:

1. Navigates to **Printers** → **wf-plotter** → **Summary** in the Print-Limit Pro administration interface.
2. Changes the **Queue type** option to **This is a virtual queue (jobs will be forwarded to a different queue)**. This reveals the **Job Redirection Settings** section.
3. The option **Jobs may be forwarded to these queues:** determines which queues `wf-plotter` is capable of redirecting to. The queues `graphics-print\wf-plotter-1` and `graphics-print\wf-plotter-2` are selected.
4. Enables the option **Enable hold/release queue** and sets **Release mode** to **User release** (the default). This ensures that jobs are held in the virtual queue and not automatically forwarded to one of the targets.
5. Clicks **OK**.
6. Repeats steps 2 through 5 for the `color-laser` queue, except the option **Jobs may be forwarded to these queues:** in step 4 is instead set to `graphics-print\color-laser-1` through `graphics-print\color-laser-7`.

The next step is to configure the release station:

1. The administrator first configures a release station as per Section 10.3, “Release Station Configuration”. The administrator decides that students should only be able to see and release the jobs they have personally printed, so sets up the release station in *Secure* mode.
2. A single release station should be configured to release jobs to the printers it is associated with by setting the `releases-on` option in the release station config file. In the print room the administrator sets the option to the four printers:

```
releases-on=graphics-print\\wf-plotter-1,graphics-print\\wf-plotter-2,\
    graphics-print\\color-laser-1,graphics-print\\color-laser-2
```

3. A separate release station is also set up next to each of the five remaining laser printers in the department. The `releases-on` is set to the single adjacent printer in each case.

Now when a student prints from a lab computer to either virtual queue (`wf-plotter` or `color-laser`) their job will be held. The student can visit the release station and see their job. When the student releases their job in the print room, the system will automatically implement load balancing and select an available compatible printer. This setup is illustrated in Figure 11.2, “Multiple Virtual Queues (Graphics Department)”.

Important

Load balancing may not be appropriate on the plotters if manual loading of paper media is required, as it is not possible to know beforehand which target printer will be selected. In this case a separate release station may be required for each plotter.

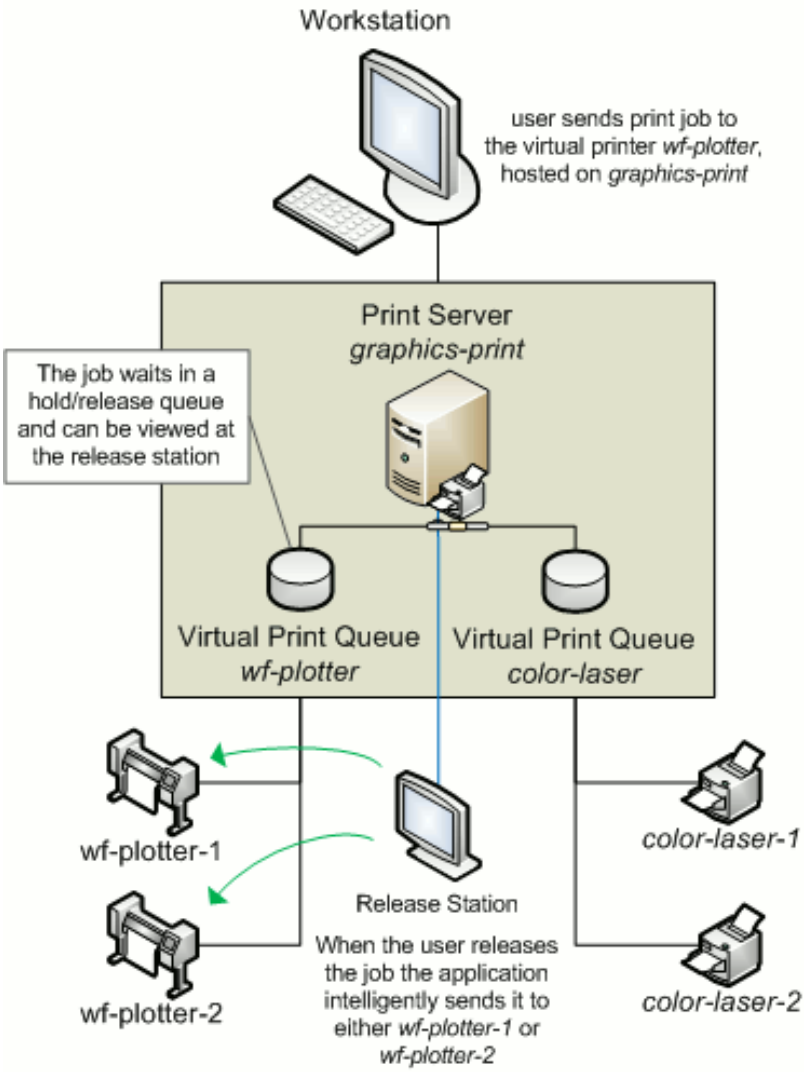

Workstation
user sends print job to the virtual printer wf-plotter, hosted on graphics-print
Print Server
graphics-print
The job waits in a hold/release queue and can be viewed at the release station
Virtual Print Queue
wf-plotter
Virtual Print Queue
color-laser
wf-plotter-1
wf-plotter-2
Release Station
When the user releases the job the application intelligently sends it to either wf-plotter-1 or wf-plotter-2
color-laser-1
color-laser-2

Figure 11.2. Multiple Virtual Queues (Graphics Department)

11.1.1.3. Example 3: Multiple Location Specific Virtual Queues (Large Company)

11.1.1.3.1. Scenario

Acme Inc. is a large organization with hundreds of printers located throughout. They maintain a common printer fleet

of grayscale devices and a smaller but matching fleet of color devices.

The existing grayscale devices use a naming scheme like `site1-server\B02_F12_G04`, where `B02` represents "building 2", `F12` represents "floor 12", `G04` meaning it is the fourth grayscale printer on that floor. Color devices use the same naming scheme except the `G` is replaced with a `C`.

Each floor of each building has a print room with several grayscale devices and two color devices. The organization also has multiple offices located and separate physical sites. Each sites hosts their local print queues on their own local print server, however all sites exist in a single WAN and shared domain.

Through trial testing, the IT administrators have confirmed that the Postscript drivers supplied with the color devices also work with the lower cost grayscale-only version of the printers. This means that one common driver will work across the full fleet.

The main goals of the project are:

- Simplify the printing process for users, so that they do not need to decipher the naming scheme to work out their closest available printer.
- Implement a system/procedure common across all sites.
- Reduce wasted printing by ensuring the user is physically present in the print room to pick up their job when it prints.
- Ensuring high uptime by minimizing single points of failure.

11.1.1.3.2. Implementation

This implementation differences from the previous implementation in that there is a large number of printers and users spread across multiple physical sites. Although it would be possible to implement one global virtual "Find-Me Queue", there are some benefits in implementing multiple virtual queues - one per site:

- Minimize network traffic - jobs should only spool on queues on the local server where possible.
- No single-point-of-failure - if an issues occurs on the single "find me queue", it would affect printing on all sites.

Implementing multiple virtual queues will offer considerable benefits. One queue per site, or maybe even one queue per floor/department on larger sites should be considered as the benefits will outweigh the small additional overhead in administration/setup.

The first step is to create the new print queues that will become the virtual queues. The administrator installs a separate queue for each site called "find-me-queue" on each of the site's servers. This queue is set up using the common Postscript driver that has been confirmed to work with all models in the printer fleet.

The administrator ensures that all print queues have registered themselves with Print-Limit Pro by checking the **Printers** tab of the administration interface. Information about adding printers can be found in Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

After creation of the new queues the administrator performs the following on each new virtual queue. (`site1` example).

1. Navigates to **Printers** → **site1-server\find-me-queue** → **Summary** in the Print-Limit Pro administration interface.
2. Changes the **Queue type** option to **This is a virtual queue (jobs will be forwarded to a different queue)**. This reveals the **Job Redirection Settings** section.
3. The option **Jobs may be forwarded to these queues:** determines which queues are compatible. Because this virtual queue is capable of forwarding to all printers in the organization the **Select all printers** is clicked.
4. Enables the option **Enable hold/release queue** and sets **Release mode** to **User release** (the default). This ensures that jobs are held in the virtual queue and not automatically forwarded to one of the targets.
5. Clicks **OK**.
6. Repeats steps 2 through 5 for all other `find-me-queue`'s on each site server.

The next step is to configure a release station for each floor's print room:

1. The administrator first configures a release station as per Section 10.3, “Release Station Configuration”. The release station is configured in *Secure* mode so that staff can only see and release the jobs they have personally printed.
2. The release station should be configured to release jobs to the printers it is associated with by setting the `releases-on` option in the release station config file. The administrator sets the option to the full name of the printer(s) in each print room:

```
releases-on=site1-server\\B02_F1_G01,\
    site1-server\\B02_F1_G02,site1-server\\B02_F1_C01
```

All workstations should be configured to use the local `find-me-queue` on each site by default.

Now when a staff member prints to either virtual queue their job will be held. The staff member can visit the release station and see their job. When the staff member releases their job it will be sent to any of the available and compatible devices in the floor's print room. This setup is illustrated in Figure 11.3, “Multiple Location Specific Virtual Queues (Large Company)”.

Advanced: Print-Limit Pro can also support redirection between print queues in different servers. In this example, it may occur when a laptop user that roams between sites prints. Their laptop may be configured to print to the virtual queue on `site1`, but they have release their job on a printer hosted on the server in `site2`. Directing between different servers is supported, however some additional configuration may be required. See Section 11.3.3, “Cross-Server Job Redirection” for further information.

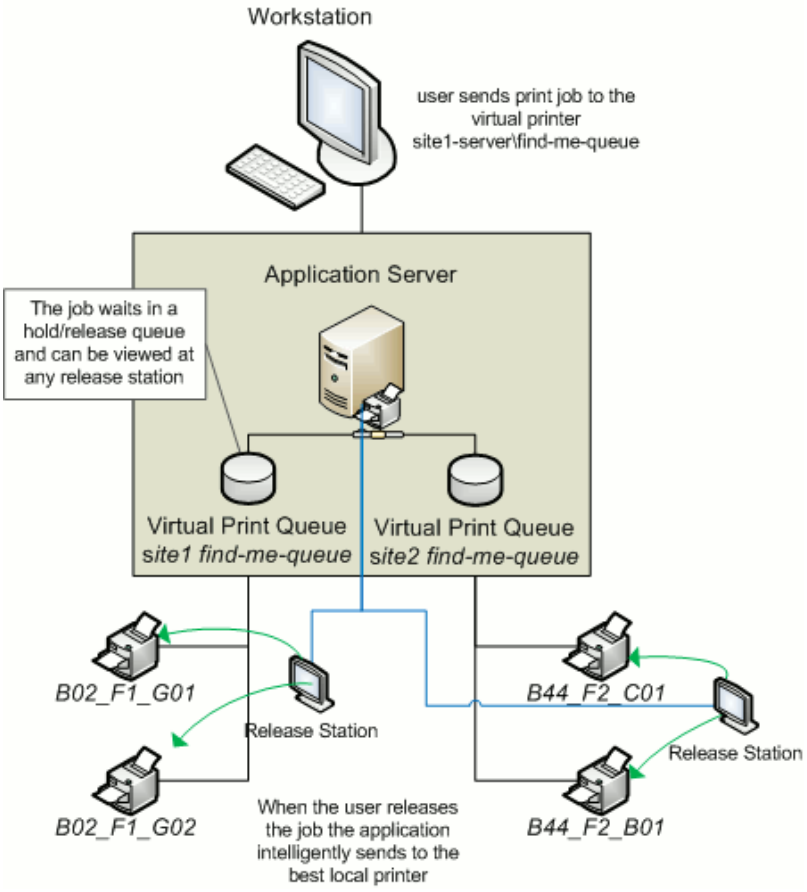

Workstation
user sends print job to the virtual printer site1-server\find-me-queue
Application Server
The job waits in a hold/release queue and can be viewed at any release station
Virtual Print Queue site1 find-me-queue
Virtual Print Queue site2 find-me-queue
B02_F1_G01
B02_F1_G02
Release Station
B44_F2_C01
B44_F2_B01
Release Station
When the user releases the job the application intelligently sends to the best local printer

Figure 11.3. Multiple Location Specific Virtual Queues (Large Company)

11.1.2. Find Me Printing and Web-Based Release

The *Find Me* printing examples covered above involve setting up a release station so that users can release jobs to the printers at their current location. The web based release interfaces are also supported (via the user web tools, admin interface or full screen web based release interface), although due to the lack of location information the user is asked to select the destination printer.

When a user releases a job held in a virtual queue using one of the web based release interfaces they are presented with a list of target printers and their locations, as shown in Figure 11.4, “Find Me Printing and Web Based Release Interfaces”.

Figure 11.4. Find Me Printing and Web Based Release Interfaces

When using web based release interfaces in conjunction with Find Me Printing it is recommended to populate the **Location** field on printers for the convenience of users.

11.2. Requirements For Job Redirection (Load Balancing or Find Me Printing)

The ability to redirect print jobs from one print queue to another is limited by several factors. Firstly, the destination printer must be able to handle the rendered print job. This means that the source (or *virtual*) print queue and the target print queue must at least use drivers that produce the same print language (e.g. PostScript to PostScript or PCL5 to PCL5). However due to the differences in the way each manufacturer uses a print language, and even differences between models from the same manufacturer, compatibility can be limited to printers of the same or similar models. E.g. if a print job has been rendered for a letter page size, it may not print correctly (or at all) when sent to a printer with ledger paper in its tray. The ideal setup for job redirection is when all target printers are of the same model. In reality this is not always possible, so when setting up job redirection to heterogeneous printers be sure to conduct thorough testing beforehand.

When selecting the driver to use for a virtual (source) print queue, pick a simple *lowest common denominator* driver and test it for compatibility with each one of your printers. On the Mac the "Generic Postscript Driver" is a good choice. On Windows select a Color Postscript driver for a mid range popular model. Always carefully test driver compatibility before implementing Find Me Printing. Take care to address corner cases such advanced graphics options, grayscale mode, paper sizes, duplexing, tray selection, etc. If a common driver can not be found, you may need to implement multiple virtual queues as discussed in Example 2 above. The following sections provide a simple procedure that can be followed to to test printer compatibility.

11.2.1. Compatibility Testing

1. Select your candidate driver to use for your global virtual queue. Use it to set up a print queue on the server, and share the queue.
2. Select the new printer in Print-Limit Pro and change it a virtual queue.
3. In the list of compatible queues, select the printers for which you'd like to test compatibility.
4. Enable the Hold/Release option on the queue.
5. Print a test document (e.g. print an email) to the virtual queue from a workstation. The job should hold in the

virtual queue.

6. On the **Jobs Pending Release** tab under the **Printers** section, release the held job. Select a target queue to test when prompted.
7. Verify that the job printed correctly. Also check the App. Log sections for any error reports.
8. Repeat the previous 3 steps for all printer types and using different document settings and applications.

Make sure you test a variety of print options targeted at all device types. Problems may manifest in various and maybe subtle ways:

- Error events logged in Print-Limit Pro's **App Log.**
- Error status on the printer (e.g. a red light and failed print status message).

Or more subtle issues like:

- Truncated documents because of different device margin sizes (printable area).
- Errors only when non-default options options are selected (e.g. finishing options).
- Issues only on very large documents (due to printer memory limitations).
- Errors/problems when certain paper sizes are selected.

If issues/problems/errors occur:

1. Try disabling the **Enable Advanced Printing Features** option in Windows on the virtual queue on the server. This is accessed by right-clicking on the printer, selecting **Properties...**, then the **Advanced** tab. This change can improve redirection results with some drivers.
2. If you continue to experience compatibility issues, you may need to consider setting up multiple virtual queues (for each printer type/class) as discussed in Section 11.1.1.2, “Example 2: Multiple Virtual Queues (Different Printer Types)”.

11.2.2. Find Me Printing Implementation Checklist

Setting up *Find Me Printing* involves several configuration steps that must be completed before the setup will work. Following is a checklist that can be used to ensure that the main requirements have been carried out. It can also serve as a troubleshooting guide in case of unexpected results.

1. A new print queue should be created to function as the virtual queue. This print queue should be created using the standard methods or tools provided by the host operating system.
2. The driver in use by the virtual queue should be confirmed to be compatible with the target printers. The output produced by this driver is what will be sent to the printer, so it must be compatible.
3. The following settings should be configured in the Print-Limit Pro administration interface for the virtual print queue:
   a. **Queue type** should be set to **This is a virtual queue (jobs will be forwarded to a different queue)**.
   b. **Jobs may be forwarded to these queues** should be configured to reflect the possible or compatible targets for redirection.
   c. **Enable hold/release queue** should be enabled.
4. When using Find Me Printing release stations are recommended because they can automatically choose the best nearby printer (based on a match between the virtual queue's configured compatible queues, the release station's configured "releases on" queues and current printer load). If the web based release interface is used instead the user must choose the desired printer from the list of all compatible queues.
5. The `releases-on` option in the release station configuration file should be configured to reflect where jobs released at this station can be sent. Print-Limit Pro will compare this list with the **Jobs may be forwarded to these queues** setting of the virtual queue to find possible target queues. Take care to ensure the name is spelt exactly the same as listed in the printer list.
6. The `show-jobs-from-queues` option in the release station configuration file may optionally be configured to

limit the jobs shown in the release station to one or more queues. This can be useful for situations with multiple virtual queues and release stations running in *Release Any* mode.

7. If there are multiple print servers and the ability to redirect jobs across print servers is required, ensure that the requirements in Section 11.3.3, “Cross-Server Job Redirection” are met.

11.3. Advanced Configuration

11.3.1. Overriding cost and filter settings

The default (and recommended) setup is to have the filter and cost settings applied to the virtual queue, for example the global "find-me-queue" as explained in the examples. This ensures that you have a common cost and access policy across all printers associated with that queue - a model that your end-users can easily understand. There may however be some special cases where you may wish to instead apply cost and filter settings based on the target queue/printer selected:

- A printer may have less memory that others and jam/error on large jobs. Implementing a page or job size filter at the target queue level may help prevent problems.
- A printer may not support the full range of paper sizes and may jam if an incorrect paper size is selected.

The settings are overridden by the option **Cost and filter settings are overridden by the target queue**. Please use this option with care and careful consideration.

Important

If used incorrectly, the **Cost and filter settings are overridden by the target queue** option can be very confusing to end-users. For example, the cost that is displayed in the release station and/or client popup will be as calculated by the virtual queue settings. If, after the job is redirected, the cost changes, the user may become confused. As a general rule, don't override the cost, or if it must be overridden, communicate this situation to your users beforehand.

11.3.2. Mixed Color and Grayscale Printers

When the organization has a mix of grayscale and color printers it is important to configure Find Me Printing carefully. Often the simplest approach is to configure 2 virtual queues: one configured as a color queue and the other as a grayscale queue. This makes it simpler for users to understand where to print and what they'll be charged if they need color or grayscale printing. The queues should be configured as follows:

- Grayscale virtual queue - configured to default to grayscale printing, the color mode detection set to **This is a grayscale printer**, and can release on all printers (including color printers).
- Color virtual queue - configured to default to color printing, and can only release to color printers.

Using a single virtual queue is also a valid option. There are no technical problems with this approach, however it may be a little more complicated for users to understand.

Important

If a physical printer is a grayscale printer then it is recommended that you set the color detection mode to **This is a grayscale printer** in Print-Limit Pro. This will ensure the the job is logged as grayscale, and the user is charged correctly (i.e. not charged for color).

This also applies if there is a single virtual queue. If the job is released to a grayscale printer it will be logged and charged as a grayscale job.

11.3.3. Cross-Server Job Redirection

Print-Limit Pro supports redirecting print jobs across print servers, but due to technical limitations the print servers must be running the same operating system (e.g. Windows to Windows, Mac to Mac, etc.).

11.3.3.1. Cross-Server Job Redirection On Windows

To enable redirection of print jobs from one Windows print server to another some additional configuration is required. This section covers the steps necessary to set it up.

The `Print-Limit Print Provider` service is the Windows service responsible for interaction with print queues. For security reasons this service, as for most other Windows services, runs as the `SYSTEM` account. This account does not have the privileges required to access another system and place a print job in one of its queues. Therefore to enable this functionality the privileges of the `Print-Limit Print Provider` service must be escalated.

The recommended way to escalate the privileges of the `Print-Limit Print Provider` service to the required level is as follows. First a service account is created with permission to create new print jobs:

1. Create a new domain user called `printlimit_service` (or something suitably descriptive). This account will be granted permission to print on both/all print servers.

   If there are multiple domains involved it may be easier to create local users on each print server which all have the *same username and password*.
2. Ensure that the **Password never expires** option is enabled.
3. Grant this user *local* administrator rights on the print server where it is installed. This gives the `printlimit_service` the same privileges as the Windows `SYSTEM` account.
4. Ensure this user has the rights to print on all remote printers.

Next the `Print-Limit Print Provider` service on each print server is configured to run as the new service account (changed from default `SYSTEM` to `printlimit_service`):

1. Open the Windows **Services** list.
2. Stop the service **Print-Limit Print Provider**.
3. Right-click the **Print-Limit Print Provider** service and select Properties.
4. Select the **Log On** tab.
5. Select the option **This account**.
6. Enter the username and password of the newly created service account.
7. Press **OK**.
8. Start the **Print-Limit Print Provider** service.

Now Print-Limit Pro should have the ability to redirect jobs to the remote print queues it has been provided access to. Test by setting up a simple job redirection scenario, such as that described in Section 11.4.1, “Example 1: Simple Load Balancing”.

11.4. Printer Load Balancing

Printer load balancing means distributing the printing load between two or more printers. While this can be implemented quite effectively by relying on users to pick a printer that is free, thereby distributing the load, the term generally refers to automatically managed load balancing.

Load balancing can be implemented in Print-Limit Pro as part of *Find Me Printing* as discussed in the proceeding section, or separately without the need for release stations in a direct printing environment. This section discusses load balancing in general including how it works, as well as how to set it up in a direct printing environment (without release stations).

Load balancing can be implemented at several different layers (none of which are usually mutually exclusive), including:

- **the hardware/network layer**, otherwise known as clustering (see Chapter 20, *Clustering and High Availability*).
- **the operating system layer**, known as printer pooling in Windows and Novell environments, and CUPS classes in Mac and Linux.
- **within Print-Limit Pro itself**, which will be the topic of this chapter.

Print-Limit Pro adds value to the load balancing available in clusters and operating systems by ensuring equal load between printers. For comparison the primary objective of Windows printer pools is to provide fault tolerance while load balancing is secondary and to a large extent non-existent. Printer pooling on Windows will often simply pick the first available printer in a predefined order. The result is that wear and tear of printers is not even; the first printer in the group will see the heaviest usage and the others may be mostly idle. System administrators often mitigate this by rotating printers periodically. With load balancing in Print-Limit Pro none of this is necessary: jobs are distributed evenly between queues based on intelligent algorithms taking into account several factors:

- An estimate of the current print load (i.e. pages remaining to print) by inspecting past print history. The estimate is done by using a Pages Per Minute (PPM) for an average printer, however Print-Limit Pro will improve on the PPM value by "watching" the printer and learning over time.
- The printer that is likely to get the job done quickest is selected.
- If all printers are currently equal (e.g. all idle), then a random printer is selected. This ensures that over time, load is distributed evenly.
- Printers currently in an error condition are avoided if possible.

Find Me Printing also makes use of printer load balancing while giving users the option of where to send their print job. For more information about Find Me Printing see Section 11.1, “Find Me Printing”.

Implementing load balancing in Print-Limit Pro is best described by way of example. The following section covers a common scenario for implementing printer load balancing.

11.4.1. Example 1: Simple Load Balancing

11.4.1.1. Scenario

The science department at East Beach High School has a computer lab with a high volume of printing. Students send their print jobs to the nearby print lab, which hosts two high volume laser printers of the same model.

The current print queues are named `sci_laser_1` and `sci_laser_2`, and are hosted on the print server called `science-lab`. Both queues use the same printer driver and settings.

In this scenario there is some natural form of load balancing, as students may select a queue at random or perhaps know which queue is available. Ideally this load balancing would be automatic, and students would not need to concern themselves with which queue to select.

11.4.1.2. Implementation

The first step is to create a new print queue on the print server. This queue will be a *virtual queue*. Students will print to this virtual queue, and Print-Limit Pro will handle the load balancing to the target ("real") queues.

A new queue simply called `sci_laser` is created by the administrator on the `science_lab` print server using the normal methods for the operating system in use. The queue is created using the same driver that `sci_laser_1` and `sci_laser_2` use. The queue points to the same physical printer that `sci_laser_1` points to. This last point is not strictly necessary but some printer drivers complain if they do not point to a real printer.

The administrator ensures that the print queue has registered itself with Print-Limit Pro by checking the **Printers** tab of the administration interface. Information about adding printers can be found in Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

Following creation of the new queue the administrator performs the following:

1. Navigates to **Printers** → **sci_laser** → **Summary** in the Print-Limit Pro administration interface.

2. Changes the **Queue type** option to **This is a virtual queue (jobs will be forwarded to a different queue)**. This reveals the **Job Redirection Settings** section.
3. The option **Jobs may be forwarded to these queues:** determines which queues `sci_laser` is capable of redirecting to. The queues `science-lab/sci_laser_1` and `science-lab/sci_laser_2` are selected.
4. Clicks **OK**.

Now when students print from a lab computer to the virtual `sci_laser` queue Print-Limit Pro will intelligently redirect the job to either `sci_laser_1` or `sci_laser_2`, as illustrated by Figure 11.5, “Simple Load Balancing”.

The administrator may now optionally un-share the `sci_laser_1` and `sci_laser_2` queues. Doing so ensures that all printing will be via `sci_laser` and hence load balanced.

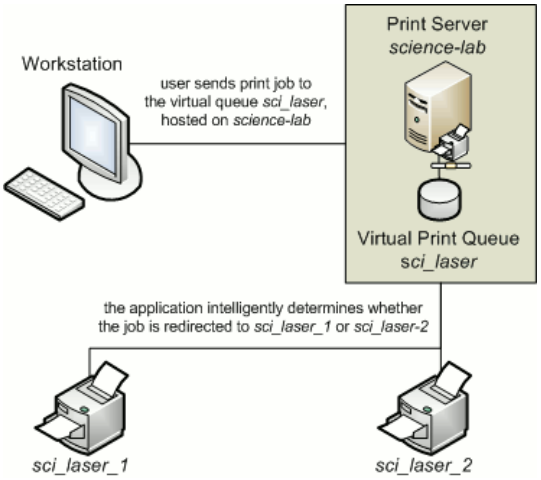


Figure 11.5. Simple Load Balancing

11.5. Find Me Printing and Printer Load Balancing FAQ

11.5.1.1.
Why do redirected jobs have document names starting like `R:123456:?`

This is a security feature. Print-Limit Pro marks redirected jobs with a special token in the document name to both distinguish between regular jobs and prevent circumvention by users.

11.5.1.2.
When jobs are redirected are they logged in Print-Limit Pro against the virtual queue or the target queues?

Jobs are logged against target queues. Virtual queues do not represent real printers and hence have no printing associated with them. This is why the Job Log and Statistics pages are disabled when viewing a virtual queue.

Chapter 12. System Management

12.1. Overview

This section discusses various options and features to assist the administrator manage and configure the application. Print-Limit Pro is designed to work with minimal initial configuration and is self-maintaining once set up. This section outlines some of the options available to the administrator, including:

- Monitoring the system activity and status of devices and users.
- Configuring the synchronization of users and groups
- Managing backups
- Configuring user notifications
- Exporting/import the data
- Defining security options
- Disabling features in the user web interface
- Display options (like whether to display the currency sign).

12.2. The Dashboard

The Dashboard tab is the first page displayed in the Print-Limit Pro administration interface. It provides an overview of system activity from the past and in real-time for devices and users. It does this by using a collection of gadgets which are described below.

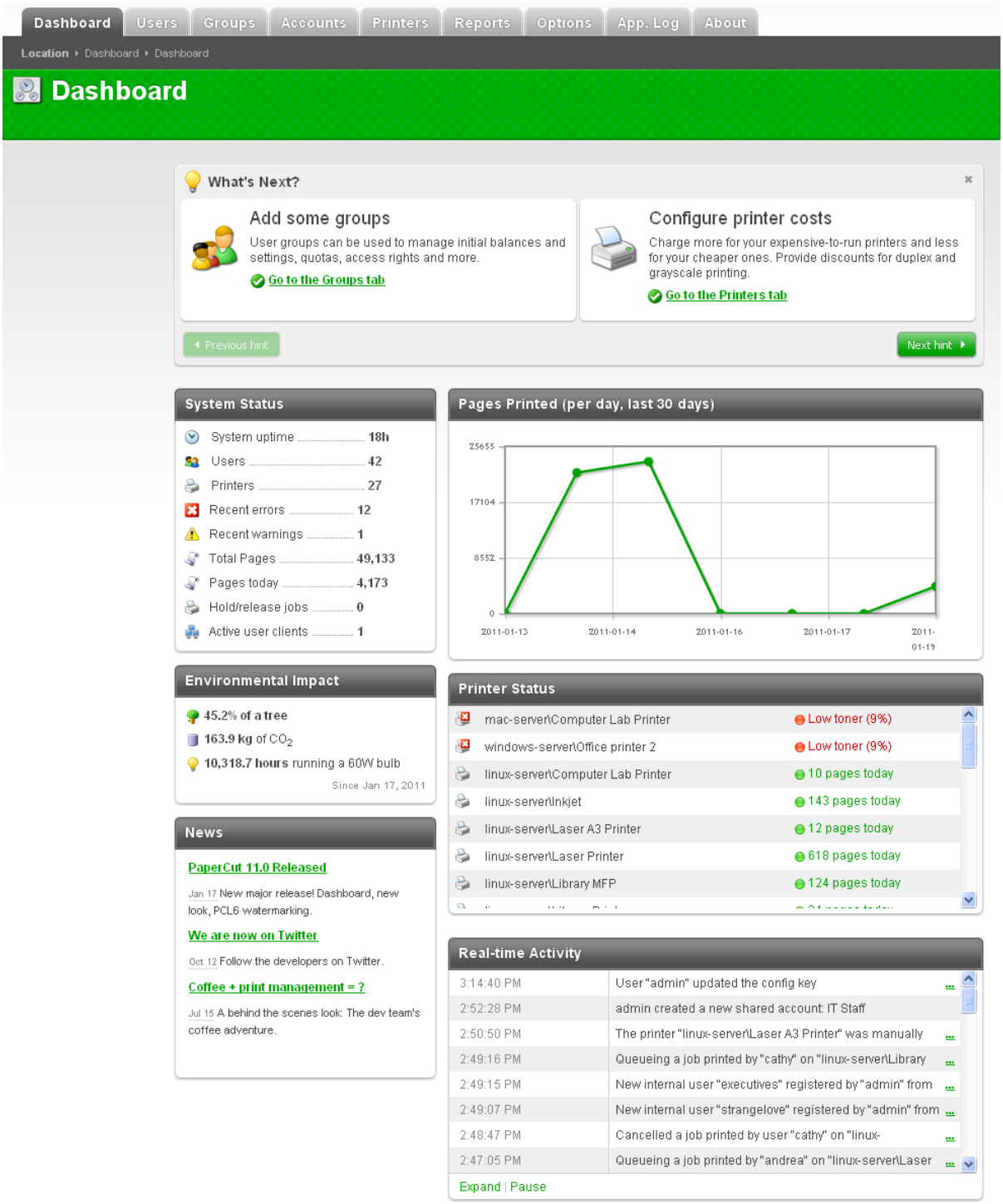

Dashboard
Users
Groups
Accounts
Printers
Reports
Options
App. Log
About
Location ▸ Dashboard ▸ Dashboard
Dashboard
What's Next?
Add some groups
User groups can be used to manage initial balances and settings, quotas, access rights and more.
Go to the Groups tab
Configure printer costs
Charge more for your expensive-to-run printers and less for your cheaper ones. Provide discounts for duplex and grayscale printing.
Go to the Printers tab
Previous hint
Next hint
System Status
System uptime 18h
Users 42
Printers 27
Recent errors 12
Recent warnings 1
Total Pages 49,133
Pages today 4,173
Hold/release jobs 0
Active user clients 1
Pages Printed (per day, last 30 days)
25655
17104
8552
0
2011-01-13
2011-01-14
2011-01-16
2011-01-17
2011-01-19
Environmental Impact
45.2% of a tree
163.9 kg of CO2
10,318.7 hours running a 60W bulb
Since Jan 17, 2011
Printer Status
mac-server\Computer Lab Printer Low toner (9%)
windows-server\Office printer 2 Low toner (9%)
linux-server\Computer Lab Printer 10 pages today
linux-server\Inkjet 143 pages today
linux-server\Laser A3 Printer 12 pages today
linux-server\Laser Printer 618 pages today
linux-server\Library MFP 124 pages today
News
PaperCut 11.0 Released
Jan 17 New major release! Dashboard, new look, PCL6 watermarking.
We are now on Twitter
Oct 12 Follow the developers on Twitter.
Coffee + print management = ?
Jul 15 A behind the scenes look: The dev team's coffee adventure.
Real-time Activity
3:14:40 PM User "admin" updated the config key
2:52:28 PM admin created a new shared account: IT Staff
2:50:50 PM The printer "linux-server\Laser A3 Printer" was manually
2:49:16 PM Queueing a job printed by "cathy" on "linux-server\Library
2:49:15 PM New internal user "executives" registered by "admin" from
2:49:07 PM New internal user "strangelove" registered by "admin" from
2:48:47 PM Cancelled a job printed by user "cathy" on "linux-
2:47:05 PM Queueing a job printed by "andrea" on "linux-server\Laser
Expand | Pause

Figure 12.1. The Dashboard Page

- *What's Next gadget*

  At the top of the page is the What's Next gadget. It gives a list of hints which are particularly useful for first-time

administrators of Print-Limit Pro. They give descriptions of useful tasks to do in Print-Limit Pro with links to other administrator interface or help pages. This gadget can be closed for more experienced administrators who no longer need it.

- *System Status gadget*

  The System Status gadget provides a list of system level statistics. They provide an overview of system information including any warnings or errors that may need attention.

- *Pages Printed gadget*

  The Pages Printed gadget provides a graph showing the trends in printing volume over the last 30 days. The graph displays after three days of data has been accumulated. When upgrading from a version of Print-Limit Pro prior to a version supporting the Dashboard feature, the data from the previous version is not displayed.

- *Environmental Impact gadget*

  The Environmental Impact gadget provides overall environmental impact statistics in terms of trees, carbon and energy. For more information on Environmental Impact, see Section 12.8, “Environmental Impact”.

- *Printer Status gadget*

  The Printer Status gadget provides a status overview of the printers managed by Print-Limit. The information displayed includes the daily number of pages printed and device alerts such as low toner levels or printer jams. Alerts for printer errors and low toner levels are also available via System Notifications. Refer to Section 12.6, “System Notifications and Emailing” for additional information.

- *News gadget*

  The News gadget ensures you're kept up to date with relevant release and development activity regarding Print-Limit.

- *Real-time Activity gadget*

  The Real-time Activity gadget shows a list of current events in real-time. It shows activities such as print jobs arriving, users logging in, exceeding print quotas, print job status, a variety of errors and much more. This tool is designed to help administrators monitor activity and diagnose problems. The events are updated as the occur and errors are highlighted in red. The events are described in a one line summary, but may be expanded by clicking on the link to the right of the message. The gadget can be expanded by clicking on the Expand item at the bottom of the gadget to display more events. Refreshing the browser page will reverse the expansion. The Pause item at the bottom of the gadget can be used if the number of events being reported makes viewing difficult.

Tip

The Real-time Activity gadget will alert you if the Print-Limit Account Selection has been configured to use the client software, and the client software is not running on the workstation. For example, if a user has popup confirmation enabled, (see Section 8.4, “The Account Selection Popup”) and the client software is not running, the job will stay paused and eventually time out. In this situation, as soon as the user prints a document the administrator will be warned in the Real-time Activity gadget that the client software is not running for that user.

12.3. User and Group Synchronization

One of the most important parts of managing Print-Limit is to configure the User and Group synchronization options. Print-Limit synchronizes user and group information from a source such as Windows Active Directory (Windows domains). This simplifies the administration of the system by avoiding the need to manage a separate database of users and groups. If a user is added to the domain or is removed from a group then Print-Limit will automatically synchronize this information without any intervention from the administrator. For example:

- Jason configures Print-Limit to assign an initial credit of $10 to users that are members of the "Students" windows security group.

- At the start of the new school year Jason has just added 100 new students to the Windows Active Directory.
- Jason also adds all the users to the "Students" Windows security group.
- When Print-Limit next synchronizes with Active Directory, the 100 new users are added to Print-Limit and automatically assigned the $10 initial credit. This is done automatically without any additional work by Jason.

Synchronization settings are configured via the **Options** → **User/Group Sync** tab.

12.3.1. Sync Source

The settings in the **Sync Source** section defines where Print-Limit imports users and groups from.

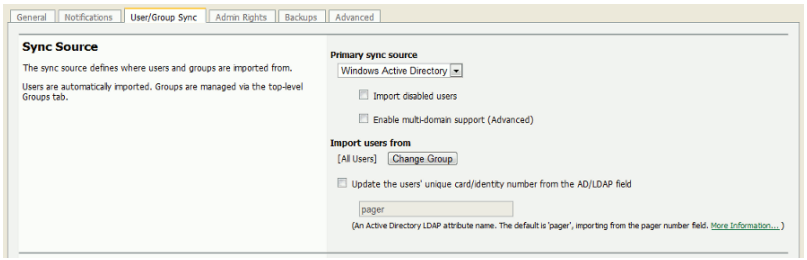

General
Notifications
User/Group Sync
Admin Rights
Backups
Advanced
Sync Source
The sync source defines where users and groups are imported from.
Users are automatically imported. Groups are managed via the top-level Groups tab.
Primary sync source
Windows Active Directory
Import disabled users
Enable multi-domain support (Advanced)
Import users from
[All Users]
Change Group
Update the users' unique card/identity number from the AD/LDAP field
pager
(An Active Directory LDAP attribute name. The default is 'pager', importing from the pager number field. More Information...)

Figure 12.2. User/group sync source options

The drop-down list under **Primary sync source** selects the type of directory server to be used. Options include **Windows Active Directory**, **LDAP** (Apple OpenDirectory, Novell eDirectory, OpenLDAP, etc.), **Windows Standard** (local users and groups for workgroup environments), **Samba** and **Unix Standard** (local users and groups / NIS / POSIX).

The **Import users from** option allows users to be imported from a specific group in the domain, rather than importing all the users in the domain. This can be useful if the domain contains old users or users who will not be printing.

If the Print-Limit server is a member of an Active Directory domain it is recommended to use this option. The advantages over the "Windows Standard" include:

- Allows using Active Directory organizational units.
- Supports nested groups for simplified user management.
- Allows importing of users from other trusted Active Directory domains.

Tip

By default, Print-Limit Pro automatically syncs user and group information with your directory each night. However additional full user/group syncs may be performed by scheduling a script to run the appropriate `server-command` command. More information on using the `server-command` can be found in Appendix A, *Tools - database, server-command scripting, and APIs (Advanced)*.

12.3.2. Sync Source Options

Depending on the selected sync source, additional options may be displayed, including:

- **Update the users' unique card/identity number from the AD/LDAP field** - allows a user card or ID number to be imported from an Active Directory or LDAP field specified. For more information see Section 12.3.6, “Importing Card/Identity numbers from Active Directory or LDAP”.

For more information about synchronizing against Windows Active Directory, see Section 12.3.8, “Using Active

Directory for user synchronization”.

For more information about synchronizing against LDAP, including descriptions of the various connection settings, see Section 12.3.9, “Using LDAP for user synchronization”.

12.3.3. Sync Options

The options listed in the **Sync Options** section control how the synchronization will take place.

- **Update users' full-name, email, department and office when synchronizing** - if a user's details in Print-Limit do not match those in the synchronization source, they will be updated.
- **Import new users and update details overnight** - when selected, synchronization will be automated to occur each night at approximately 12:55am. This option will never delete users from Print-Limit.
- **Delete users that do not exist in the selected source** - deletes users from Print-Limit if they no longer exist in the selected synchronization source.

  This option only applies to manual synchronization (clicking **Synchronize Now**) and will not delete users when automatically synchronizing overnight. Enabling the option will also only apply once (i.e. the option must be clicked before a manual sync each time when users are to be deleted).

  This option only affects users added via the synchronization source (e.g. the domain) and will *not* delete internal users.

12.3.4. Secondary Sync Source (Advanced)

Enabling a secondary sync source allows Print-Limit to merge the results from two independent sources. Examples for where this may be useful include:

- A school with an Active Directory domain for the majority of users and a separate LDAP server that is used and managed by one department.
- An organization with a "new" LDAP server and an old "legacy" LDAP server with separate but unique users that have not been migrated to the new server.
- A university with an Active Directory for the Windows student workstations and an Open Directory for the staff Mac workstations.

When enabled, Print-Limit will query both sources to find users and groups. Usernames are treated as globally unique, so the same username existing in both sources will be treated as the same user (in this case, the details for the user will be merged, with the primary sync source taking priority). If there is an error connecting to or synchronizing against either source then no actions will take place.

12.3.5. Manual Synchronization

By default, Print-Limit Pro automatically re-syncs the user and group information each night, however the sync process can also be initiated manually. To initiate a manual sync:

1. Navigate to the **Options** → **User/Group sync** tab.
2. Press the **Synchronize Now** button.
3. The sync process will start and a status window will open showing the status of the sync process.

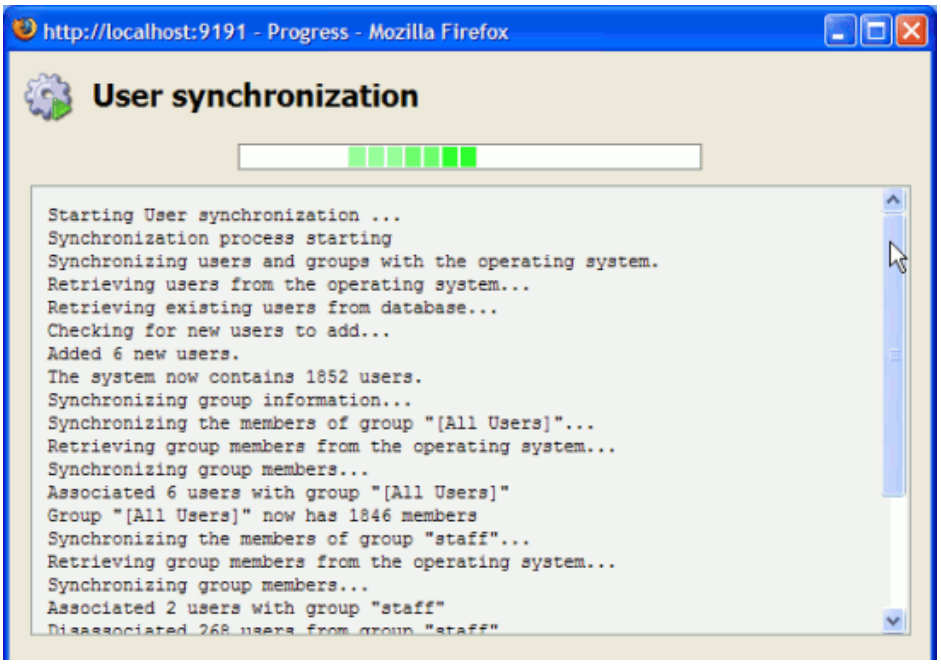

http://localhost:9191 - Progress - Mozilla Firefox
User synchronization
Starting User synchronization ...
Synchronization process starting
Synchronizing users and groups with the operating system.
Retrieving users from the operating system...
Retrieving existing users from database...
Checking for new users to add...
Added 6 new users.
The system now contains 1852 users.
Synchronizing group information...
Synchronizing the members of group "[All Users]"...
Retrieving group members from the operating system...
Synchronizing group members...
Associated 6 users with group "[All Users]"
Group "[All Users]" now has 1846 members
Synchronizing the members of group "staff"...
Retrieving group members from the operating system...
Synchronizing group members...
Associated 2 users with group "staff"

Figure 12.3. Progress of a user/group synchronization process

12.3.6. Importing Card/Identity numbers from Active Directory or LDAP

In Print-Limit Pro a unique card/identity number can be associated with each user. The card number is used as an alternative to usernames/passwords for authentication at software release stations, or at hardware terminals attached to photocopiers. The card/ID number can also be searched in the user quick-find in the **User List** page.

The card/ID number can be entered manually in the user interface, imported using the batch user import/update feature (see Section 6.6, “Batch User Data Import and Update”), or imported using the batch user card/identity update feature (see Section 6.7, “Batch User Card/Identity Update”), however it is usually more convenient to automatically import them from Active Directory or LDAP. Unlike other fields like full-name and email address there is no single field used exclusively for card numbers. For this reason Print-Limit Pro allows specifying the field to import the card/ID number from.

To enable importing the card/identity number, first enable the **Update users' full-name, email, department and office when synchronizing** and the **Update the users' unique card/ID number from the AD/LDAP field** options. Then enter the field name to import the card/identity number from and press **Apply**. For more information on the field names to use, see the sections on Active Directory and LDAP below.

Important

The card/ID number must uniquely identify a user, so you should ensure that no two users have the same card/identity number. The card/identity numbers you have defined in your user source should be unique. If Print-Limit Pro finds a non-unique card/identity number it will not update the user's details, and will display a warning in the synchronization results.

12.3.6.1. Importing the Card/Identity number from Active Directory

Active Directory has a number of user fields that can be used to store the user's card/identity number. Some of these fields are editable in the user's properties in the **Active Directory Users and Computer** tool, but others can only be updated with other tools. By default, Print-Limit Pro will import the card/identity number from the user's pager number field (i.e. the `pager` field). This field was chosen because it is rarely used and is also editable in the

Windows user interface. If this field is not suitable, you can choose any valid Active Directory user field.

The list of standard Active Directory user fields can be found on the Microsoft web site here: http://msdn2.microsoft.com/en-us/library/ms683980.aspx. The field name entered in Print-Limit Pro must be in the LDAP display name format. For example, if you want to use the `Employee-Number` field, then the field name entered into Print-Limit Pro should be `employeeNumber` as shown on the `Employee-Number` attribute page here: http://msdn2.microsoft.com/en-us/library/ms675662.aspx

Important

If the field name is entered incorrectly, the synchronization will fail. It is therefore important to test your configuration changes. To test the changes, press the **Test Settings** button. If the card number is retrieved correctly, then they will be listed as the 4th user field in the test output.

12.3.6.2. Importing the Card/Identity number from LDAP

LDAP provides a very flexible way to store a variety of user related information. The fields available depend on LDAP server being used and how that is configured. Many LDAP servers also allow administrators to create custom fields to store additional custom user information. It is recommended you consult your LDAP server's documentation or talk to your LDAP administrator to understand which LDAP field your stores the user card/ID number.

By default, Print-Limit Pro uses the `employeeNumber` field to retrieve the card number. This is a standard LDAP field, but id this is not suitable, you can choose any valid LDAP user field.

Important

It is important to test the card numbers are being retrieved correctly. To test the changes, press the **Test Settings** button. If the card number is retrieved correctly, then they will be listed as the 4th user field in the test output.

12.3.6.3. Using a regular expression to extract the card/id number from an LDAP/AD field

The vast majority of sites store the full card number in a single field in AD/LDAP. In this situation there is no need to use a regular expression (regex) to extract the card number. A regular expression is only required under some unusual specific circumstances, including:

1. The field contains more then just the card number. For example, if the field contained a card number and student number separated by a comma (e.g. 12345678,0003456).
2. The multi-valued LDAP/AD field contains multiple values and only one representing the card number. e.g. Some third party authentication management systems store external IDs (like card numbers) in a single multi-valued LDAP field. NOTE: For multi-value fields, Print-Limit will import all the field values separated by TABs by default. The regex may be used to extract the required portion of the field.

To use a regular expression to extract the card/id number, enable the **Apply regular expression to extract card number** option on the **User/Group Sync** page. Then enter the regular expression used to extract the card number. The regular expression must contain a capture group (represented by parentheses), that represents the part of the field that the card number is extracted from.

The simplest way to create a regular expression is to start from one of the examples that follow.

Regular Expression	Description
`([\d]+)`	Extracts the first sequence of digits. e.g. if the field contains `12345678,005678` then `12345678` is extracted.
`([\d]{5})`	Extracts the first sequence of 5 digits. e.g. if the field contains `12345678` then `12345` is extracted.
`=([\d]+)`	Extracts the sequence of digits after the = character. e.g. if the field contains

Regular Expression	Description
	`12345678=56789"` then `56789` is extracted.
`([\d]+)::abc`	Extracts the sequence of digits preceding the text `::abc`. This is a common notation when storing identities in a multi-valued field in LDAP. The `::abc` notation is used to indicate the different identity types. In this example, if the field contains `1234::xyz 5678:qrs 9876::abc` then `9876` is extracted.

Table 12.1. Example regular expressions to extract card numbers

Regular expressions are an advanced topic and can be tricky to get just right. For more information on regular expressions and a test tool see http://www.fileformat.info/tool/regex.htm. If you need assistance, please contact support.

12.3.7. On Demand User Creation

The **On Demand User Creation** setting defines if and when Print-Limit Pro will create new users. The settings applied to newly created users are defined by their group membership (for more information see Section 6.3, “New User Creation Rules”). By default, new users are created automatically when they print for the first time, start the user client tool or log into the user web tools. This makes administration much easier, as there is no need for additional administration when new users come along; they can use Print-Limit Pro straight away.

In some situations it may be preferable to change the way new users are treated. For example when just one department is being tracked, but there are other departments using the same printers, it may be preferable to allow the other departments' users to print, but not to track them using Print-Limit Pro.

There are three options available for the setting **When the user does not exist:**

1. *create the user on demand (default)* - users are created when they interact with Print-Limit Pro for the first time. E.g. when they print for the first time.
2. *do not create the user and allow usage* - users interacting with Print-Limit Pro who do not already exist will not be created, but their usage will be allowed. The usage will not be logged.
3. *do not create the user and deny usage* - users interacting with Print-Limit Pro who do not already exist will not be created, and their usage will be denied. The usage will not be logged.

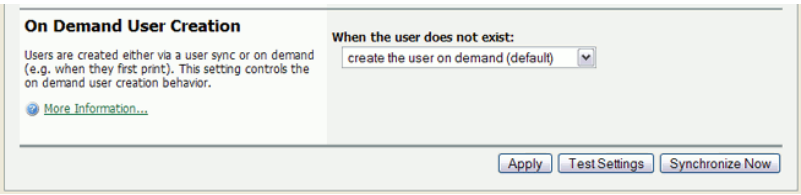

On Demand User Creation
Users are created either via a user sync or on demand (e.g. when they first print). This setting controls the on demand user creation behavior.
More Information...
When the user does not exist:
create the user on demand (default)
Apply
Test Settings
Synchronize Now

Figure 12.4. On demand user creation options

To change the behavior, select the desired option and press **Apply**.

12.3.8. Using Active Directory for user synchronization

Print-Limit Pro's Active Directory integration is performed at a native level and supports advanced features such as nested groups and OU's. Some additional options provided with the Active Directory interface include:

- *Import disabled users* - If set, all users, including disabled accounts will be imported from the domain. In an education environment it is recommended to leave this option on as often student accounts are disabled for disciplinary actions, and removing the account from Print-Limit Pro is not appropriate.
- *Enable multi-domain support* - This is an advanced option and is appropriate for larger sites running multiple trusted domains. For example, in an education environment it is common to have separate domains for students and staff/teachers with a one-way trust relationship. This option can bring in groups, OU's and users from both domains.

The list of domains is semicolon separated (`;`). This list should contain the name of the domains in DNS dot notation, and should include the name of the current domain if importing from this domain is desired.

Trust domain relationships are a complex area and administrators are advised to use the **Test** button to verify that the settings result in the desired behavior. The total number of user accounts is a good measure.

12.3.9. Using LDAP for user synchronization

LDAP (Lightweight Directory Access Protocol) directories usually store information about user and groups in an organization. One of the most common uses of LDAP is to provide single sign-on on a network that comprises multiple platforms and applications. When a network consists of only Windows computers, then an Active Directory domain can be used. But when there is a mix of Windows, Apple and Linux machines then LDAP can provided the single source of user, group and authentication information. (It is worth noting that both Active Directory and Novell eDirectory implement the LDAP protocol).

Print-Limit Pro can use an LDAP directory for user authentication and as a source of user and group information. LDAP can either be enabled at installation time, or by changing the user source option in **Options** → **User/Group sync**. When enabling LDAP, a number of configuration settings must be specified to allow the application to connect to the LDAP server. Please ask your LDAP administrator what values to use for the various options:

- *LDAP Server Type* - Determines which LDAP fields are used to get user and group information.
- *LDAP Host address* - The hostname or IP address of the LDAP server.
- *Use SSL* - Indicates if an encrypted SSL connection should be used to connect to the LDAP server. The LDAP server requires SSL support to be enabled and should accept connections on the standard LDAPS port 636.
- *Base DN* - This is the Base DN of the LDAP server. This is the equivalent of the "suffix" config setting of the OpenLDAP server. For example, if the domain hosted by the LDAP server is "domain.com" then the Base DN might be `DC=domain,DC=com`. The format of the Base DN can differ significantly depending on configuration. Some older Novell eDirectory installations may require a blank Base DN to operate. Some examples:

  ```
  DC=myschool,DC=edu,DC=au
  DC=myorganization,DC=com
  OU=OrgUnit,DC=domain,DC=com
  DC=local
  ```

- *Admin DN* - The DN of the user who has permission to connect to and query the LDAP server. This is typically an administrative user, although it can be a user that only has read-only access to the LDAP server. An example of the DN of the Administrator user on a Windows AD domain "domain.com", would be `CN=Administrator,CN=Users,DC=domain,DC=com`. The exact format of the DN depends on the LDAP server. Some examples:
  - Windows Active Directory: `CN=Administrator,CN=Users,DC=domain,DC=com`
  - Windows Active Directory (in organizational unit): `CN=administrator,OU=OrgUnit,DC=domain,DC=com`
  - Mac Open Directory: `uid=diradmin,CN=users,DC=domain,DC=com`
  - Unix Open LDAP: `uid=root,DC=domain,DC=com`, or `uid=ldapadmin,DC=domain,DC=com`
  - Novell eDirectory: `CN=root,DC=domain,DC=com`, or `CN=ldapadmin,OU=users,DC=domain,DC=com`.
- *Admin password* - The password for the above user.

Tip

Some LDAP servers are configured to allow 'anonymous' LDAP query access. In these situations, the **Admin DN** and **Admin password** may be left blank.

Print-Limit Pro supports the following server types:

- Novell eDirectory
- Microsoft Active Directory
- Unix / Open Directory

However, it is easy to support other server types by adjusting the LDAP fields Print-Limit Pro searches. This is discussed in Appendix C, *Advanced LDAP Configuration*.

12.4. Assigning Administrator Level Access

Print-Limit Pro sets up one administrator account called “admin”. This is the master administrator account, with access to all features, whose password is assigned during the configuration wizard. In large organizations it is likely that administrator level access will need to be granted to more than one person. One solution is to give all persons the master password; however the recommended approach is to assign administrator rights to these individual's network user accounts. The advantages of this approach are:

- They can access the administration pages using their own username and password (they don't have to remember another password!).
- Different levels of administrator access can be assigned to the user. Print-Limit Pro includes an advanced Access Control List (ACL) allowing different administrators access to different functions and areas of the application.
- Most activity is audited so changes can be sourced to an individual.

Administrator access may be assigned at the group or user level. Assigning admin access to a group is convenient for giving the same permissions to multiple users. Assigning admin access to a user is useful when specific permissions are required. See the following sections for more detail.

Tip

Administrative users should login via `http://servername:9191/admin` rather than `http://servername:9191/`, `http://servername:9191/app` or `http://servername:9191/user` so that they are directed to the correct interface.

Important

Print-Limit Pro allows different levels of administrator access to be defined via access control list. The access list is presented as a series of checkboxes enabling or disabling access to selected features or application areas.

For security reasons it is advisable to:

- Grant the user's own accounts administrator level rights rather than have them use the general built-in `admin` account.
- Grant the administrator the minimum level rights need for them to perform their job.
- ACL configuration can be complex. Always test that the ACL rights assigned work as expected by asking the administrator to log in and verify that they can access the required program functions.

12.4.1. Assigning Administrator Access to a Group

Assigning administrator access to a group is useful when many users all require access to the same functionality. For example, the `Management` group might be assigned access to reporting functionality only.

Groups in Print-Limit Pro are mirrored from the domain / directory server. Before a group can be used, it must be added to Print-Limit Pro (see Section 6.1, “Groups in Print-Limit Pro” for more information). By default Print-Limit Pro

synchronizes users' group membership with the domain / directory server overnight. If a user has been added to a group in the domain / directory and requires group level admin access on the same day, a manual synchronization should be run. See Section 12.3, “User and Group Synchronization” for more information.

Example: assigning the `Management` group access to reporting features:

1. Log in to the system as the built in `admin` user.
2. Ensure that the `Management` group has been imported into Print-Limit Pro (see Section 6.1, “Groups in Print-Limit Pro” for more information).
3. Navigate to the **Options** → **Admin Rights** page.
4. In the field titled **Assign administrator access to this group:**, select the `Management` group from the list, and click **Add Group**.

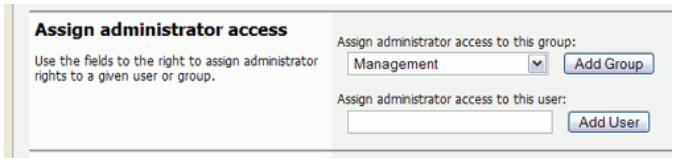

Assign administrator access
Use the fields to the right to assign administrator rights to a given user or group.
Assign administrator access to this group:
Management
Add Group
Assign administrator access to this user:
Add User

Figure 12.5. The list of users and groups granted admin access

5. By default `Management` will have access to all features. To change this, click on the **show/hide details** link to the right of `Management`'s entry.
6. Deselect all access rights for `Management` except **Access reports section**. When finished, click **Apply** to save the changes.
7. Test by logging into the administrator interface as a user in the `Management` group, and checking that access is allowed just to the **Reports** section.

Tip

The *scheduled reports* feature can automatically deliver selected reports via email to interested parties. See Section 9.4, “Scheduling and Emailing Reports” for more information.

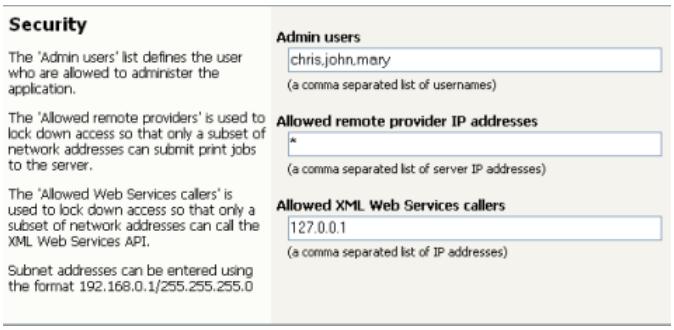

Security
The 'Admin users' list defines the user who are allowed to administer the application.
The 'Allowed remote providers' is used to lock down access so that only a subset of network addresses can submit print jobs to the server.
The 'Allowed Web Services callers' is used to lock down access so that only a subset of network addresses can call the XML Web Services API.
Subnet addresses can be entered using the format 192.168.0.1/255.255.255.0
Admin users
chris,john,mary
(a comma separated list of usernames)
Allowed remote provider IP addresses
*
(a comma separated list of server IP addresses)
Allowed XML Web Services callers
127.0.0.1
(a comma separated list of IP addresses)

Figure 12.6. The list of users and groups granted admin access

12.4.2. Assigning Administrator Access to a User

Assigning access to an individual user is suitable when the access rights are specific to that user. For example, the junior system administrator `mary` might be assigned access to all functionality except the ability to grant administrator rights to other users.

Assigning the user with login name `mary` all admin rights except the ability to grant admin rights to other users:

1. Log in to the system as the built in `admin` user.
2. Navigate to the **Options** → **Admin Rights** page.
3. Enter `mary` into the field titled **Assign administrator access to this user:** and click **Add User**.
4. By default `mary` will have access to all features. To change this, click on the **show/hide details** link to the right of `mary`'s entry.
5. Deselect the access right **Access admin rights settings** for `mary`.
6. Click on the **Apply** button to save the change.
7. Verify that Mary can now log into the administrator interface, but is unable to access the **Admin Rights** section.

12.5. System Backups

As with any application, it is important to ensure that backups are performed regularly. Print-Limit Pro includes a built-in backup process that saves the state of the database to a file. The in-built backup functionality is designed to complement (not replace) a good system-wide backup policy and procedure. The backup is stored in the industry standard XML format that is compressed using the standard ZIP format to reduce disk-space on the server and your backup medium. The use of these open standards ensures that your data is always available and accessible.

Print-Limit Pro makes the process of managing backups simple by automatically performing a weekly backup. The backup file is in the following directory:

```
[app-path]\server\data\backups
```

The weekly backups are performed at 20 minutes past midnight on Sunday morning (or as otherwise defined by the `schedule.weekly` config key. Please see Section 12.9, “Using the Config Editor” to find out how to change config keys.)

Tip

In accordance with backup best practice, the above directory should be regularly backed-up to offline media (e.g. tape, CD or remote server). This will allow the data to be restored in the case the server hard-drive is corrupted. An example backup script called `copy-backups-to-remote-server.bat` found at `[app-path]/server/examples/scripting/batch/` may help administrators automate the process of maintaining an off-disk copy.

On larger networks, it may be desirable to perform backups more frequently than the in-built once a week period. The `server-command` tool may be used to execute the backup task at other times. Simply write a script (e.g. batch file) to execute `server-command perform-online-backup`. Schedule the script to run at the desired intervals. More information on `server-command` is available in Section A.1, “Server Commands (server-command)”.

12.5.1. Performing an Online Backup

In addition to the automated weekly backups, it is also possible to manually initiate a backup. This might be useful to back up the system before performing an upgrade. To perform a manual backup:

1. Navigate to the **Options** → **Backups** page.
2. Press the **Backup Now** button.
3. A window will open showing the backup progress and the location where the backup file is saved.

12.5.2. Restoring a Backup

There are a number of situations when it might be necessary to restore a database, including:

- Hardware or system failure requires you to rebuild the server and reinstall Print-Limit Pro.

- A new print server was purchased and Print-Limit Pro is being moved to a new server.
- To import data into an external RDBMS (See Chapter 18, *Deployment on an External Database (RDBMS)*).

To restore from a backup:

1. Locate a previous backup file.
2. Shutdown the application server (See Section A.6, “Stopping and Starting the Application Server”). The database cannot be in-use when performing the restore, so the application server needs to be stopped first.
3. Open a command prompt. Change to the server binaries directory. On a Windows system the directory location is `[app-path]\server\bin\win\`.
4. Re-initialize the database back to an empty state by typing the following:

   ```
   db-tools init-db -f
   ```

5. Run the import process by executing the following:

   ```
   db-tools import-db -f "C:\path\to\backup\backup-file-name.zip"
   ```

   (Or, `./db-tools` on some systems. See Section A.2, “Database Tool (db-tools)” for more information on using `db-tools`) NOTE: On Mac/Linux ensure proper permissions for access to the file, e.g.

   ```
   chown printlimit:admin \path\to\backup\backup-file-name.zip
   ```

6. The import will ask whether the existing database data should be deleted before proceeding.
7. Once the import has completed, restart the application server (See Section A.6, “Stopping and Starting the Application Server”).

12.5.3. Performing Offline Backups

Performing an online backup (as discussed above) is a simple and convenient process, but it is sometimes necessary to perform an offline backup. For example:

- To integrate into your existing backup procedures, it might be necessary to write a script or batch file to perform a backup at a known point in time.
- When it is necessary to guarantee that the backup captures all the data. When performing an online backup the system is still in use so data could be modified after the backup completes.

To perform an offline backup:

1. Stop the application server (See Section A.6, “Stopping and Starting the Application Server”). To ensure all data is captured, the application server must be stopped to perform an offline backup.
2. Open a command prompt. On a Windows system change to the following directory: `[app-path]\server\bin\win\`
3. Run the database export process by executing:

   ```
   db-tools export-db
   ```

   (This will create a backup file in the system backups directory and the filename named with a timestamp).

   The export command has additional options that allows you to specify a different directory or filename. See

Section A.2.1, “export-db Command” for more details.

12.5.4. Backup File Retention

Backup files in

```
[app-path]\server\data\backups
```

will be retained for 30 days and then deleted. This number of days can be changed on the **Options** → **Backups** page under "Keep backups for ... days". This period will automatically be extended should backups not be performed on a regular basis, i.e. when automatic backup have been temporarily disabled for a time or when skipping scheduled backups due to a system outage. Older backups files will not be deleted unless a number of new backups have been performed. At the very least the latest backup file will always be retained regardless of its age.

12.6. System Notifications and Emailing

This section describes system notifications and how they can be configured to assist your users and administrators. Print-Limit Pro includes built-in notifications to alert users and administrators of a important pieces of information. Examples of these notifications include:

- Alerting a user when their account balance drops below a given balance.
- Displaying a message explaining why a print job was denied (e.g. not enough credit; the printer is disabled; the print job contains too many pages).
- Alerting administrators or key IT support staff to problems such as printer jams, or application errors.

The message that is delivered to the user can be customized to suit your organization. For example, if the user is denied printing for some reason, you may wish to direct the user to the intranet page that discusses printing policies and guidelines.

Important

Notifications are important to your users because they let them know why their print jobs were denied. If notifications are not enabled, users print jobs might be deleted without them knowing and they will not understand what happened. They might then contact the Administrator or Help Desk for assistance. If they received a notification, then this situation is avoided.

System notifications can be delivered to the user in a number of ways, and the administrator can decide the preferred option. The delivery options available include:

- Winpopup (or "net send") - this is useful in a Windows network but workstations running other operating systems may not receive these messages.
- User Client - messages are sent to users running the Print-Limit Pro User Client tool. This option is guaranteed to work in all environments where the user runs the user client.
- Email - messages are delivered by email, to the email address defined in the system. This is a good alternative for "low balance warning" messages but is not recommended for real-time messages like when printing is denied.
- Custom - this allows you to develop your own message delivery mechanism. This might be useful if your organization has an instant messaging infrastructure.

12.6.1. Configuring Notifications

Print-Limit Pro provides flexible options for configuring the various notifications. The administrator can choose to:

- Enable/disable each of the notification types.
- Change the notification message to suit your organization.

- Choose the delivery method for each notification type.

Notification text can be modified to suit your organization's requirements. The notification text is a template that can include some special fields that are replaced by the system when the message is sent. They can be used to provide more detailed information to the user. These fields are surrounded by percent characters (%).

The default notification text in the application shows a variety of examples using these fields. For a list of the fields available in each type of notification, see the following sections covering each notification type in more detail.

12.6.1.1. Printing Notifications

To change printing notification options, navigate to **Printers** → **Notification Options**.

Field	Description
%user%	The username of the user receiving the message.
%full_name%	The full name of the user receiving the message.
%date%	The date/time that the message was sent.
%balance%	The user's current balance.
%cost%	The cost of the print job.
%printer%	The printer the job was printed to.
%document%	The name of the document printed.
%pages%	The total number of pages in the print job.
%copies%	The number of copies of the document printed.
%paper-size%	The size of the paper used to print the document.

Table 12.2. Fields available in printing notifications

12.6.1.2. Low Balance Notification

To change low balance notification options, navigate to **Options** → **Notifications**, and scroll down to the "Low Balance Notification" section.

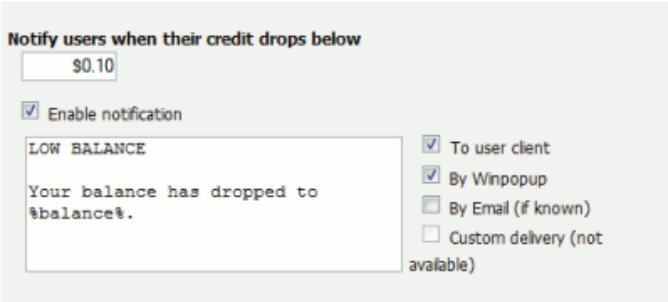


Figure 12.7. Options for a single system notification

Using the notification options (shown above), the notification can be enabled, the notification text can be changed, and the delivery type can be modified.

Field	Description
%balance%	The user's current balance.

Table 12.3. Fields available in low balance notifications

Important

This low balance notification is only sent to users who are set as restricted.

12.6.1.3. Configuring Email Notifications

Before sending notifications via email, the system needs to know the SMTP server to deliver emails to. The SMTP server can be internal or external to your organization however it must allow forwarding of emails to your users. The SMTP server will typically be the same server that users set in their email application to send emails.

To set the SMTP server:

1. Navigate to **Options** → **Notifications**.
2. Find the **Email Options** section.
3. Enter the SMTP server in the field provided.
4. It is also recommended that the **subject** and **from address** are changed to be applicable for your environment.
5. Press the **Apply** button.

Tip

If your email server requires SMTP authentication, the username and password can be configured by setting the `notify.smtp.username` and `notify.smtp.password` settings in the advanced configuration editor. For more information see Section 12.9, “Using the Config Editor”.

If your email server supports encrypted SMTP using TLS (e.g Gmail), you can enable this by changing the setting `notify.smtp.enable-tls` to `Y`. For more information see Section 12.9, “Using the Config Editor”. Most SMTP servers will allow encrypted communication using the default port 25. If the SMTP server uses an alternate port for TLS encryption the port can be configured with the `notify.smtp.port` setting.

Important

Anti-virus software running on the Print-Limit Pro server can block/disallow SMTP connections because it attempts to block SPAM sent by viruses and trojans. Ensure that any anti-virus software is configured to allow Print-Limit Pro to make SMTP connections (e.g. add an exception or disable the SMTP blocking).

When anti-virus is blocking email delivery Print-Limit Pro will log errors like: `Mail server connection failed. Software caused connection abort.`. These errors are displayed in the application log or on-screen when performing email notification tests.

If there are other SMTP connection problems, you should check that your firewall allows SMTP connections, and that your SMTP server is configured to accept connections from the Print-Limit Pro server.

12.6.1.4. Configuring Email Addresses

To send notification messages to users via email, an email address needs to be defined for the user. User email addresses can be entered in the **User Details** screen. However, if all email addresses match the pattern `[username]@yourdomain.com`, then the email addresses can be defined globally using the global email suffix.

An example of how this works is as follows:

1. An email notification needs to be sent to user `brian`.
2. No email address has been defined in Brian's user details, but a global email suffix of `@myschool.com` is defined in the **Email Options** section.
3. To generate Brian's email address, the username (`brian`) and suffix (`@myschool.com`) are combined to form the email address `brian@myschool.com`.

To define the global email suffix:

1. Navigate to **Options** → **Notifications**.
2. Find the **Email Options** section.
3. Enable the **Use email suffix to build user email addresses** option.
4. Enter the Email Address Suffix.
5. Press the **Apply** button.

To confirm that the email suffix is working as expected:

1. Navigate to the **Users** section.
2. Select a user from the list.
3. The **Use global email suffix** option should be enabled, and the email field should contain the address constructed from the username and suffix.

12.6.2. System Notifications (for Administrators)

Hardware and software errors will happen on all networks from time to time. The key to minimizing disruption is to act on errors fast. Print-Limit Pro's error notifications feature will help keep response times down by proactively notifying key staff of error events. Take for example a paper jam. It might take several hours before an annoyed user reports the problem as most users may simply opt to use another printer. Automated email notifications take the "human factor" out of the loop.

Print-Limit Pro's can also notify the administrator when printer toner levels are low (for supported printers). This allows for toner to be purchased and replaced pro-actively to minimise downtime of the printer fleet.

To enable and configure error notification options, navigate to **Options** → **Notifications**, and scroll down to the "System Notifications" section. The following notification types are available:

- *Printer errors:* Notify when a printer enters an error state for a selected period of time.
- *Low Toner warnings:* Notify when a printer runs low on toner (for supported printers).
- *Application errors:* Notify if a software or application error is detected. This option will allow administrators to proactively act on errors raised in the **App. Log** section.
- *License errors:* Notify on important license events such as exceeding the licensed user limit.

All error notifications can be enabled using the checkbox, and a list of recipient email addresses can be specified. Multiple email addresses can be entered by separating them with a comma, e.g. `joe@domain.org,bill@domain.org`.

Tip

Consider SMS alerts: Error notifications are often important and require urgent attention. Many organizations use an email-to-SMS gateway service to ensure technical staff can receive urgent messages from anywhere in the building via the text message service on their cell/mobile phones.

12.6.2.1. Printer error notifications

Printer error notifications can be used to give advance warning when printers go into an error state.

Print-Limit Pro detects a printer error if either the print queue or the job at the top of the print queue are in an error state. This is equivalent to clicking on the print queue from the operating system and checking its status.

Some errors that might be seen on print queues or jobs include: `paper jam`, `out of paper`, `out of toner`, `out of memory`, `device is offline`, `device door is open`, or a generic error. The actual errors reported depend on the printer driver and which ones it supports.

The message can include information such as the name and location of the printer, the reason for the error, and how many jobs are pending in the queue (an indication of the impact).

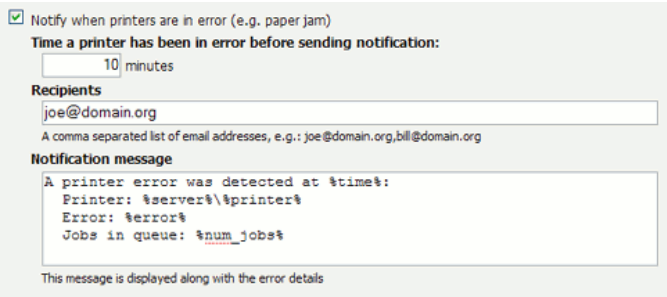

Notify when printers are in error (e.g. paper jam)
Time a printer has been in error before sending notification:
10 minutes
Recipients
joe@domain.org
A comma separated list of email addresses, e.g.: joe@domain.org,bill@domain.org
Notification message
A printer error was detected at %time%:
Printer: %server%\%printer%
Error: %error%
Jobs in queue: %num_jobs%
This message is displayed along with the error details

Figure 12.8. Printer error notification settings

The setting `Time a printer has been in error before sending notification` can be used to decide how soon a notification should be sent after a printer goes into error. For example if there is a paper jam the user might be able to fix it themselves, and raising an immediate notification is unnecessary. The suggested default is 10 minutes as problems lasting longer than this are probably more serious and will need technical intervention.

The following special fields can be used in printer error event notifications:

Field	Description
%time%	The time the printer error was first reported.
%printer%	The name of the errored printer.
%location%	The location of the errored printer.
%error%	The error message detail. E.g. `Paper jam`.
%num_jobs%	The number of print jobs currently in the queue. This information can be used as a guide to judge the severity of the error. For example, if a printer goes into error while there are 30 jobs in the queue, there are probably quite a few people waiting.

Table 12.4. Fields available in printer error notifications

12.6.2.2. Printer low toner notifications

Printer low toner notifications are used give advance warning when printers are running low on toner. This allows administrators to ensure that printers never run out of toner and improves printer uptime.

The printer toner notifications are available for supported network printers. The toner information is retrieved from the printer using SNMP over the network. To use low toner notifications, ensure that SNMP is enabled on your printer and that your network/firewalls/switches allows the Print-Limit Pro server to send SNMP requests to the printers. For more information see Section 7.15, “Toner Levels (for supported printers)”.

The notification message lists each printer that is low in toner, and includes toner levels for all the printer's toner

cartidges. The notification message is sent each weekday at 10:30am by default.

Tip

If you would prefer to only be notified when new printers run low in toner, set the `notify.toner-level.only-send-if-new` to `Y` in the Config Editor (see Section 12.9, “Using the Config Editor”).

Notify when printers are low in toner (for supported printers)
Send notifications when toner level drops below:
15%
Recipients
matt.doran@papercut.com
A comma separated list of email addresses, e.g.: joe@domain.org,bill@domain.org
Notification message
The printers listed below are low in toner:
This message is displayed along with the notification details

Figure 12.9. Low toner notification settings

12.6.2.3. Error level event notifications

Error level event notifications help to draw the attention of the administrator to any errors that might occur. This could involve events such as problems contacting a directory server, software crashes, or processing problems.

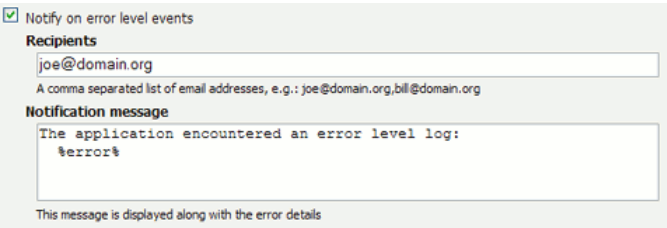

Notify on error level events
Recipients
joe@domain.org
A comma separated list of email addresses, e.g.: joe@domain.org,bill@domain.org
Notification message
The application encountered an error level log:
%error%
This message is displayed along with the error details

Figure 12.10. Error level event notification settings

The following special fields can be used in error level event notifications:

Field	Description
%error%	The error message detail.

Table 12.5. Fields available in error level event notifications

12.6.2.4. Pending refund request notifications

Pending refund requests notifications help to draw attention of the administrator to pending refund requests. By default, daily notification messages are sent at 7 a.m.

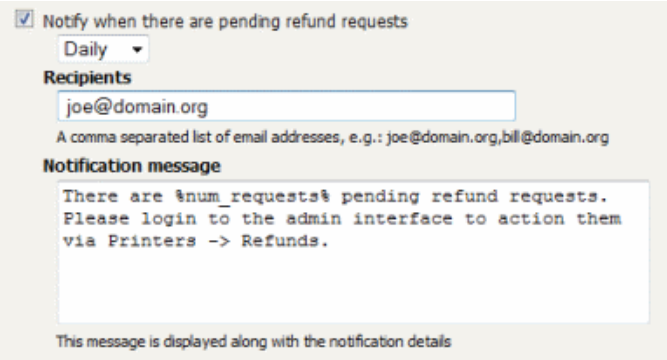

Notify when there are pending refund requests
Daily
Recipients
joe@domain.org
A comma separated list of email addresses, e.g.: joe@domain.org,bill@domain.org
Notification message
There are %num_requests% pending refund requests.
Please login to the admin interface to action them
via Printers -> Refunds.
This message is displayed along with the notification details

Figure 12.11. Pending refund request notification settings

The following special fields can be used in pending refund request notifications:

Field	Description
%num_requests%	The number of pending refund requests.

Table 12.6. Fields available in pending refund request notifications

12.6.3. Testing Notification Methods

Once the system notifications are configured, it is useful to test that messages can be delivered. Print-Limit Pro provides a function to send test messages to users. This allows you to verify that notifications are working without having to try to produce notifications artificially. To send a test notification:

1. Navigate to the **Options** → **Notifications**.
2. Scroll to the bottom of the page to the **Test Notifications** section.
3. Enter the username of the user to send the message to.
4. Select the delivery method to use.
5. Enter the notification message to send.
6. Press the **Send Test Notification** button
7. Verify that the notification was received.

12.7. System Security Options

The default installation of Print-Limit Pro is configured to be secure by default. After initial installation only the `admin` user defined during the setup process is permitted to administer the system. To allow additional users to administer Print-Limit Pro follow the instructions defined in Section 4.7, “Assigning Administrator Level Access”.

12.7.1. Application Server Connections

By default Print-Limit Pro runs an internal web server on port 9191. All communication with the server uses HTTP to this port and includes connections by:

- administrators to connect to the administration interface
- users to connect to the end-user interface
- the user client to communicate with the server to get the user balance and receive notifications; and
- the information providers (as discussed in Section 1.1.2, “Key Features”) to send information to the server

It is therefore important that all of the above clients can access this port on the server from across the entire network. If your organization uses firewalls between departments or campuses then it will be necessary to allow inbound HTTP connections on port 9191 to the Print-Limit Pro application server.

The application server port can be changed from 9191 to any other value.

Important

If the application server port is changed, the port number also must be changed in the applications that connect to the server. i.e, the print provider and the user client.

To change the application server port:

1. On the server, navigate to the `[app-path]\server\` directory.
2. Open the file `server.properties`.
3. Change the `server.port` to setting to the desired port.
4. Change the server port in all providers installed on your network. The server port is set in the `print-provider.conf` file in the provider directory.
5. Change the server port in the user client config file: `[app-path]\client\config.properties`.

Important

If the client is installed locally on workstations, then the config file will need to be changed on each workstation.

On Linux/Unix systems, the server runs under the privilege of a non-root account. Some systems may prevent non-root users from binding to ports lower than 1024. An alternate option is to use kernel level TCP port redirection (e.g. `iptables`).

6. Restart the application server. (See Section A.6, “Stopping and Starting the Application Server”).

12.7.2. Provider Connection Security

The Print-Limit Pro architecture (as discussed in Section 1.2.3, “Architecture Overview” and Section 14.4, “Print Monitoring Architecture”) involves having a central application server and multiple information providers that send data to the server to process. One example of a provider is the print provider which monitors printing and sends the printer activity to the central server.

Print-Limit Pro supports an unlimited number of information providers and they can be located on anywhere on the network. By default Print-Limit Pro allows these providers to connect from any machine on the network. This can be restricted to a reduced set of machines by specifying a list of IP addresses or subnets that are allowed to submit information to the application server.

To define the list of addresses that providers can connect from:

1. Navigate to **Options** → **General**.
2. Scroll down to the **Security** section.
3. Enter the list of IP addresses or subnet masks to allow. The list of addresses is comma separated. The format of the subnet is `X.X.X.X/Y.Y.Y.Y` (where X represents the address and Y the subnet mask).
4. Press **Apply**.
5. It is then recommended to test all providers to ensure that they can still submit information to the application server. To test the print provider, perform a test print job to the server that the provider is running on.

12.8. Environmental Impact

One of the primary aims of Print-Limit Pro is to reduce printing levels by changing a user's printing behavior. Implementing monitoring, quotas and charging are a good way of drawing a user's attention to their habits. The topic of the environment, global warming, and waste management is currently an area of debate and interest to many. Highlighting the environmental aspects of their activities is another good way of modifying a user's behavior.

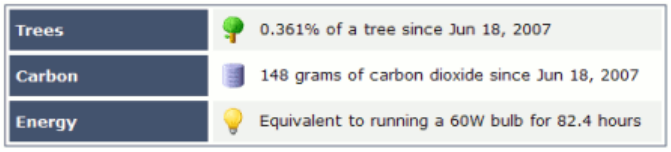

Trees
0.361% of a tree since Jun 18, 2007
Carbon
148 grams of carbon dioxide since Jun 18, 2007
Energy
Equivalent to running a 60W bulb for 82.4 hours

Figure 12.12. Draw a user's attention to their environmental impact

The *Environmental Impact* section is available to end-users via their web summary page (See Section 5.3.2, “Environmental Impact” for more details). Administrators also can view the impact of a user and a printer via the details pages in the admin interface.

The meaning of the reported values and how they are calculated are detailed below:

Field	Description
Trees	This value corresponds to percentage of a tree that has gone into making the paper. The value assumes the user is printing on standard A4 or Letter sheets and 80,500 sheets make up a tree [a] This value is set by the config key: `environment.sheets-per-tree`
Carbon	This value corresponds to greenhouse gases released in the production of the paper (CO_2 equivalent). The value assumes that the user is printing on standard A4 or Letter sheets and one sheet equals 4.5g CO_2 [b]. The default value takes in account CO_2 produced as a byproduct of the paper production only. It does not take into account the power consumed by the printer or power associated with the ink / toner use and production. Finding referenced figures on these values is difficult, and one could argue that the printer power consumption is not a function of the user's usage as the printer would be there consuming power even if they choose not to use the device. This value is set by the config key: `environment.co2-grams-per-sheet`
Energy	This value represents the manufacturing energy used to produce the paper. The energy value is represented by relating it to the equivalent energy consumed by a standard light bulb. This provides users with a real world understanding of the value. This value assumes the user is printing a standard A4 or Letter sheet and that the manufacturing cost per sheet is 17Wh [c]. This is an appropriate amount for virgin office paper. 12Wh is more appropriate for 100% recycled paper [d]. This value is set by the config key: `environment.watt-hours-per-sheet`

Table 12.7. Environmental Impact Reporting

[a] A single tree can produce about 80,500 sheets of paper according to *How Much Information? 2003* filed by University of California at Berkeley, http://www2.sims.berkeley.edu/research/projects/how-much-info-2003/print.htm.
[b] Office paper produces 0.27 metric tons of carbon equivalent (MTCE) per ton of paper, according to the USA EPA report *Greenhouse Gas Emissions From Management of Selected Materials in Municipal Solid Waste*, 1998, p26, http://www.epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf. This amount is equal to 1.0 metric tons of CO_2 carbon equivalents per metric ton of paper. The *Environmental Energy Technologies Division* of the *U.S. Department of Energy* indicate that there are about 220,000 paper sheets in a ton: http://eetd.lbl.gov/paper/ideas/html/copyfactsM.htm.
[c] According to the *Environmental Energy Technologies Division* of the *U.S. Department of Energy*, the manufacturing cost of virgin office paper is 17 Watt hours: http://eetd.lbl.gov/paper/ideas/html/issues.htm.
[d] According to the *Environmental Energy Technologies Division* of the *U.S. Department of Energy*, the manufacturing cost of 100% recycled office paper is 12 Watt hours: http://eetd.lbl.gov/paper/ideas/html/issues.htm.

Tip

Config keys can be set by at **Options** → **Config editor (advanced)**.

12.9. Using the Config Editor

Most of the settings in Print-Limit Pro are easily accessible via the main admin interface (e.g. the Options tab). Some advanced settings are however only accessible via the Config Editor. The Config Editor stores keys or information used by Print-Limit Pro to configure various options and functions. This is very similar to the Windows System Registry database.

Administrator can edit config keys using the following procedure:

1. Login to the system as an administrator (e.g. the built-in admin account).
2. Navigate to the Options section.
3. Click on the "Config editor (advanced)" link in the Actions list on the left.
4. In the quick find, enter the config key name and press **GO**.
5. Locate the required key and enter a new value.
6. Press the **Update** button to the right to apply the change.

Example of some keys that are often changed by administrators include:

- **client.config.show-link** - Indicates whether the link at the top of the user client should be displayed or not.
- **client.config.show-details-link** - Indicates whether the "Details" link that points to the user web interface is displayed or not.
- **display.login-instruction** - Used to display login instructions on the user/password screen.

Important

Take care when using the Config Editor. If you use the Config Editor incorrectly, you may cause serious problems which can only be fixed by reinstallation of the application.

Chapter 13. PrintCards

Many organizations run Print-Limit Pro in either a silent logging mode or as a way of enforcing sensible quotas. On the other hand, other organizations choose to run Print-Limit Pro in “charging mode” requiring users to make payments in advance. Recording and entering payments can be a time consuming process for staff or system managers. Print-Limit Pro offers a web interface for user account management to assist with the process, however there is still the need for someone to manually assign credit. The PrintCard system included with Print-Limit streamlines the payment process and moves much of the manual handling over to the end-user.

Cards are also known as:

- Vouchers
- Re-Charge Cards
- Pre-Paid Cards

13.1. Cards by Example

The card system is best described by walking through the payment process:

13.1.1. The User's Perspective

Amy is a student at a local high school. The school uses Print-Limit Pro for their charging. Amy is allocated $5.00 a week for printing and Internet use. This week she has used all her allocation but still has one assignment to print on Friday. She purchases a $5.00 Card from the school canteen. The card contains a 16-digit identification number. She logs onto the schools intranet site, enters the Print-Limit section, and enters the card's ID number. Her account is automatically credited $5.00.

13.1.2. The Administrator's Perspective

Andrew is a system administrator at the same high school. At the start of the term he used the Print-Limit Pro card wizard to generate 500 PrintCard of $5.00 value. These were generated in 2 batches. The first batch was prefixed with C1 and the second batch L1. The C1 batch was sold at the school canteen and the L1 batch sold at the school library. The cards are kept secured at these locations.

The card wizard generated a *number definition file* for each batch. Andrew imported these numbers into Print-Limit. Andrew took the time to customize the look of the cards to include the school logo and simple instructions on how to redeem the card.

During the year Andrew is able to track the cards sold and uses the batch prefixes to track where students like to purchase cards. Andrew also keeps an eye on the event log and has disciplined students attempting to guess card numbers.

13.2. The Card System

Netop has worked with a number of organizations to design the PrintCard system. A number of payment technologies were evaluated over the period of two years. These technologies included vending machines, smart cards, micro-payment systems, and manual processing. The card system proved to be the most successful and cost effective solution. The card concept is now the de facto standard in other industries such as pre-paid mobile phones.

The Print-Limit Pro card system is 100% software based. There is no need for special hardware such as smart card readers or special vending machines.

The card system is included as standard with Print-Limit Pro. The system includes:

- A card wizard application for assisting with the process of creating new cards.
- A web page for end-users to enter card numbers.
- A security framework for tracking card redemption and implementing fraud prevention.

13.3. Creating New Cards

13.3.1. Overview and Definitions

Cards are generated using the *Card Wizard*. The card wizard is a Microsoft Windows application that integrates with Microsoft Word. The card wizard install can be downloaded from inside the Print-Limit Pro administration login under the Card section. The download link is located in the **Actions** area.

Important

The *Card Wizard* integrates with Microsoft Word. Please ensure that Microsoft Word is installed before using the *Card Wizard*.

Term	Definition
Card Wizard	A tool to help administrators produce a set of cards. The wizard generates cards ready for printing and a *number definition file* suitable for importing into the Print-Limit Pro system.
Card Number	All cards are designated a random unique number. Print-Limit uses this number to identify the card and its value. Users enter this number to allocate the credit to their account. An example number: `P0409-1945-4833-5750-4452`
Batch ID	A batch ID is a user defined ID or number assigned to all cards in a batch. The batch ID will prefix all card numbers and are used to identify the source of a card. A unique number should be assigned to each batch.
Valid Till Date (Expiration Date)	Define the date on which a card can no longer be used. It's analogous to a "use by" date on a gift certificate. Expiration dates ensures cards only remain in circulation for a limited period of time. A six to 12 month period is recommended. In a school environment it may be useful to define an expiration date as the last day of the semester.
Mail Merge	Mail merge is an advanced feature of Microsoft Word. The mail merge feature takes a design template and a data source, and merges the two together to construct a composite document. In the card wizard's case, the number list is the data source and the design template is the template Microsoft Word document.
Number Definition File	The number definition file contains information on all cards in a batch including a list of card numbers, their expiration date, and value. The card wizard creates this file during the generation process and the system administrator will import this file into the Card administration section.
Card Number Entry Page	The card web entry page is a designated page inside the user login section.

Table 13.1. Card Terminology

13.3.2. Using the Card Wizard

This section will walk you through the process of creating a batch of PrintCards. The example covers creating a batch of 100 cards of value $10.00 each.

The Cards feature is accessed via the **Cards** tab. By default there is no **Cards** tab in the Professional (Client Billing) installation. You can enable the **Cards** tab by navigating to the **Options** section and selecting **Enable use of TopUp/PrePaid Cards**. Click **Apply.**

13.3.2.1. Step 1 - Install the card wizard

Log onto a desktop system with Microsoft Word installed (normally not the server!). Open a web browser at:

```
http://[server_name]:9191/admin
```

Log into Print-Limit Pro as `admin` and navigate to the **Cards** section. Download the card wizard from the **Download card wizard** action. Run the install program and complete the installation process.

13.3.2.2. Step 2 - Welcome

Open the *Card Wizard* from the start menu, and press **Next>**.

13.3.2.3. Step 3 - Batch ID & Format

Enter a unique *batch ID* to define this batch and click **Next>**. We recommend adapting a consistent convention. For example, choose numbers representing the date, or a sequential numbering scheme.

The wizard offers a choice of two popular card number formats. The **Numeric** format is the most secure and generates long numbers. The **Alphanumeric** format produces a shorter format consisting of letters and numbers. The Alphanumeric format is a little less secure due to the reduced number of possible permutations, however it does offer a shorter, more convenient entry format.

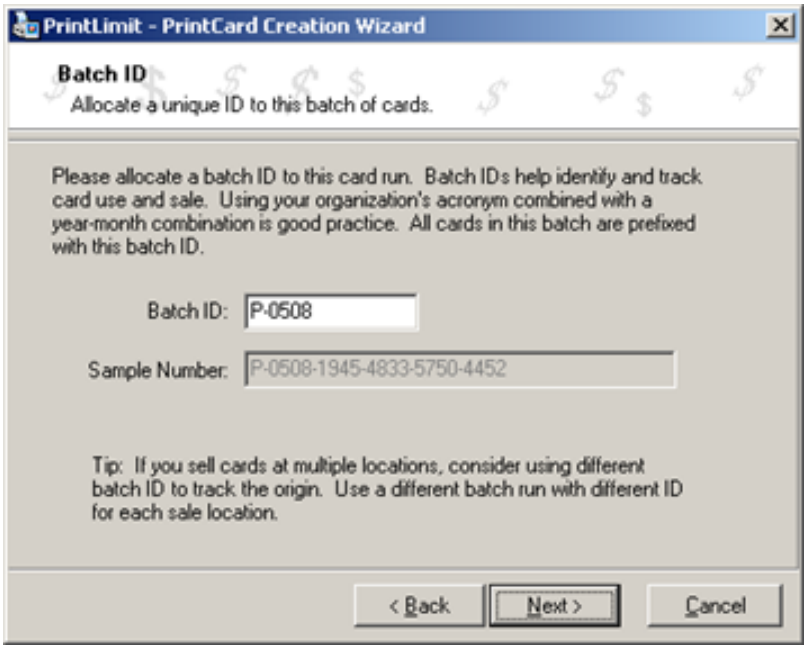

PrintLimit - PrintCard Creation Wizard
Batch ID
Allocate a unique ID to this batch of cards.
Please allocate a batch ID to this card run. Batch IDs help identify and track card use and sale. Using your organization's acronym combined with a year-month combination is good practice. All cards in this batch are prefixed with this batch ID.
Batch ID:
P-0508
Sample Number:
P-0508-1945-4833-5750-4452
Tip: If you sell cards at multiple locations, consider using different batch ID to track the origin. Use a different batch run with different ID for each sale location.
< Back
Next >
Cancel

Figure 13.1. Entering a batch ID

13.3.2.4. Step 4 - Card Attributes

Ensure that the number of cards is set up to 100 and the value of each card is $10.00. By default the valid till date is set 6 months in the future. We recommend defining an appropriate date that corresponds to a fixed event such as the end of the year, budget year, term or semester.

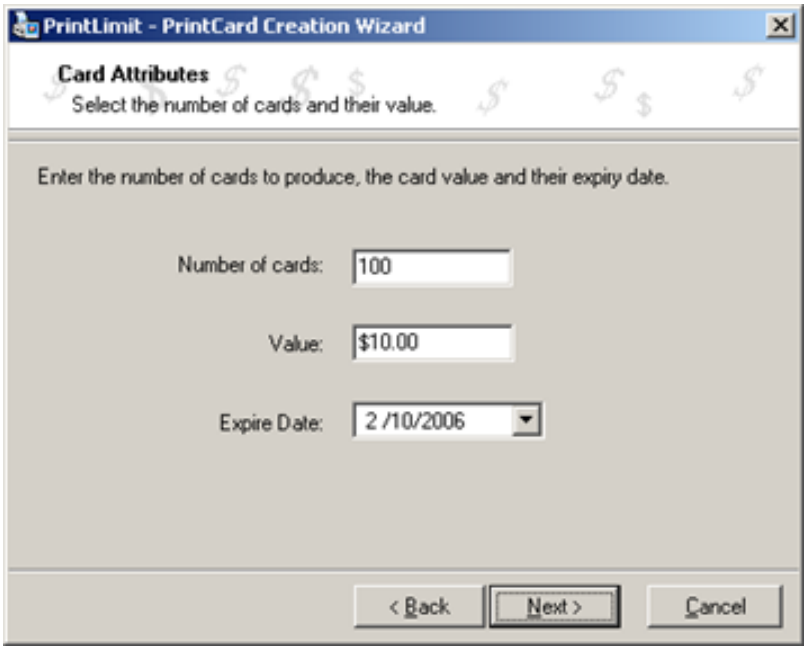


Figure 13.2. Defining a valid till date

13.3.2.5. Step 5 - Design

To produce a set of standard cards, custom design is not required. Simply click the **Next>** button to move to the next step. Modifying the custom design requires knowledge of Microsoft Word's mail merge functionality. See the Section 13.3.3, “PrintCard Tips” for further details.

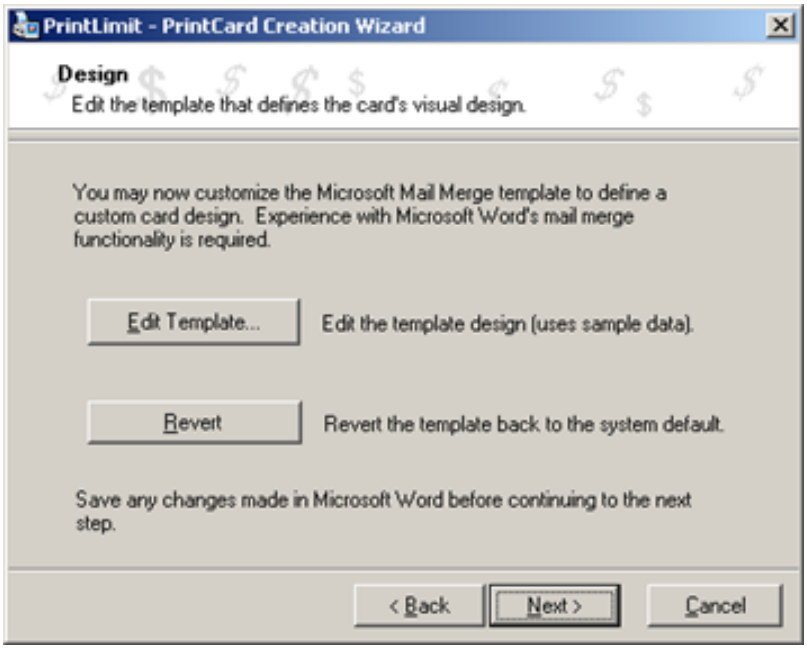

PrintLimit - PrintCard Creation Wizard
Design
Edit the template that defines the card's visual design.
You may now customize the Microsoft Mail Merge template to define a custom card design. Experience with Microsoft Word's mail merge functionality is required.
Edit Template...
Edit the template design (uses sample data).
Revert
Revert the template back to the system default.
Save any changes made in Microsoft Word before continuing to the next step.
< Back
Next >
Cancel

Figure 13.3. Options to edit the card design

13.3.2.6. Step 6 - Generate Numbers

Press **Next>** to generate the card numbers. The card wizard will prompt you for a location to save the *number definition file*. Save the file on the local hard driver or a secure network drive.

13.3.2.7. Step 7 - Create Cards

The card wizard will now generate a merged Microsoft Word document. Before generating the Word document, the card wizard will ask you if Macros have been enabled in Microsoft Word. If the answer is no, or you are unsure, please say **No** and the card wizard will guide you through the process of enabling Macros. The card wizard uses Word Macros to automate much of the card generation process.

If using Word 2007, after opening the document a Security warning is displayed on the Message Bar. You will need to enable macros by selecting "Enable this content" after clicking on "Options" on the Message Bar.

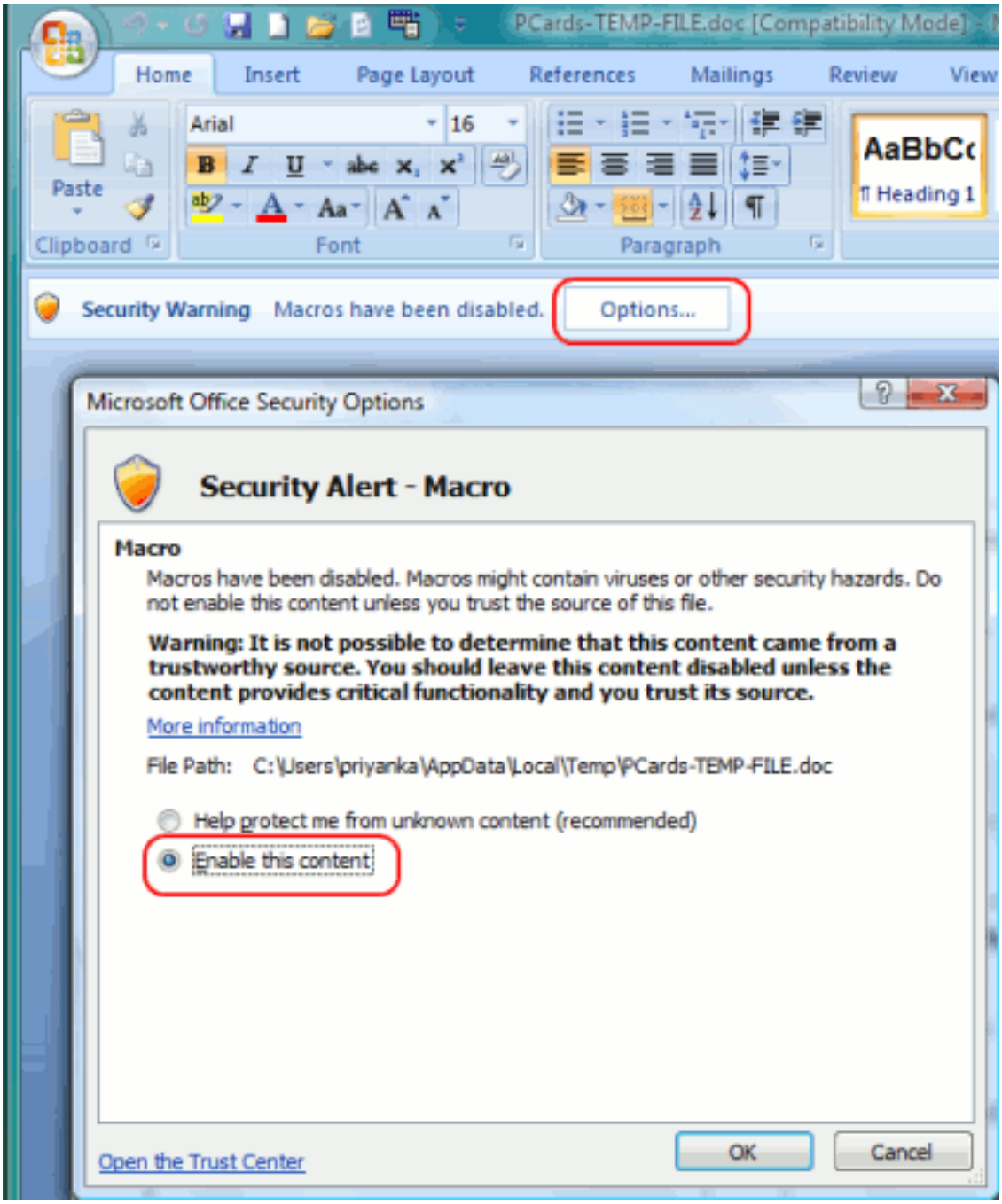


Figure 13.4. Enable Macros in MS Word 2007

13.3.2.8. Step 8 - Printing Cards

A new Microsoft Word document will open, listing all 100 cards. The cards are standard business card size suitable for printing on heavy paper and cutting with a paper cutter. For a professional look, consider forwarding a PDF version to your local printing shop. See Section 13.3.3, “PrintCard Tips” for more ideas.

Figure 13.5. Cards ready for printing

13.3.2.9. Step 9 - Importing

The final step is to activate the cards by importing the *number definition file* in the Print-Limit Pro admin section.

1. Navigate to the **Card** section.
2. Select the **Import New Cards** action.
3. Click the **Browse** button and locate the number definition file as saved in step 5 above.
4. Click the **Upload** button.

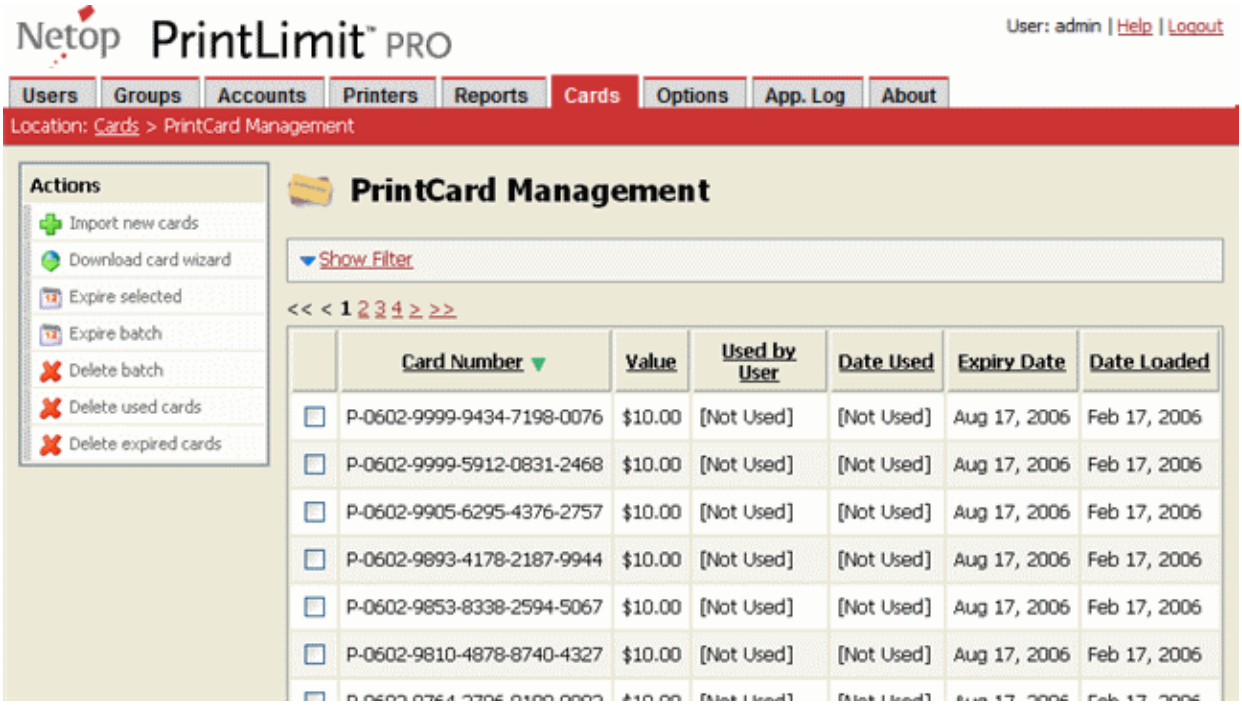


Figure 13.6. Imported card numbers

13.3.2.10. Step 10 - Testing

It is good practice to test the card process by using one of the cards on a test account (standard user level). Remember to destroy the spent card used for the test!

13.3.3. PrintCard Tips

13.3.3.1. Security

The Print-Limit Pro card system is designed with security in mind. All fraudulent card redemption attempts are detected, trapped and logged. The number allocation system is highly secure and guessing a number is “statistically impossible”. With 1,000 cards in circulation, the chance of guessing a number is 1-in-10,000,000,000,000, or in non-mathematical terms, it would take over 300,000 years to guess a number if a person enters one number every second!

Like many IT security systems, the weakest link in the system is the human interface. Cards are a form of virtual currency. Care should be taken to protect the cards from unauthorized access and disclosure.

- Ensure the generated Microsoft Word document is deleted or saved in a secure place after the cards are printed.
- Always delete the number definition file after importing the batch into Print-Limit.
- Never leave the cards in an unsecured or visible location. Consider sealing cards in envelopes.
- Check the Print-Limit Pro application event log on a weekly basis for security messages. Print-Limit will log and trap unauthorized card use.
- Use the card log to track card redemption and allocation.
- Cancel/Expire lost or stolen cards by batch number as soon as the problem is reported.

Important

> The cards are like a form of cash and should be treated with the same care. Make sure the cards are carefully secured.

13.3.3.2. Cards Design

The **Edit Template...** button in Step 4 of the card wizard opens the standard card template for editing. The card wizard is able to use any standard mail merge design. It's even possible to convert the template layout to letters rather than cards. Microsoft's mail merge support is designed for Word “power users”. Consider taking the step-by-step mail merge tutorial provided with Microsoft Word help if you do not have experience with Word's mail merge functionality.

Consider keeping your customizations initially simple and work up towards more complex configuration.

To change the logo graphic:

1. Click the **Edit Template...** button in step 5.
2. Say **Yes** to **Enable Macros**.
3. Select the standard *Print-Limit logo* on the *first* card and press the *Delete* button on the keyboard.
4. Select **Insert** → **Picture** → **From File...**
5. Locate the desired logo and click **Insert**.

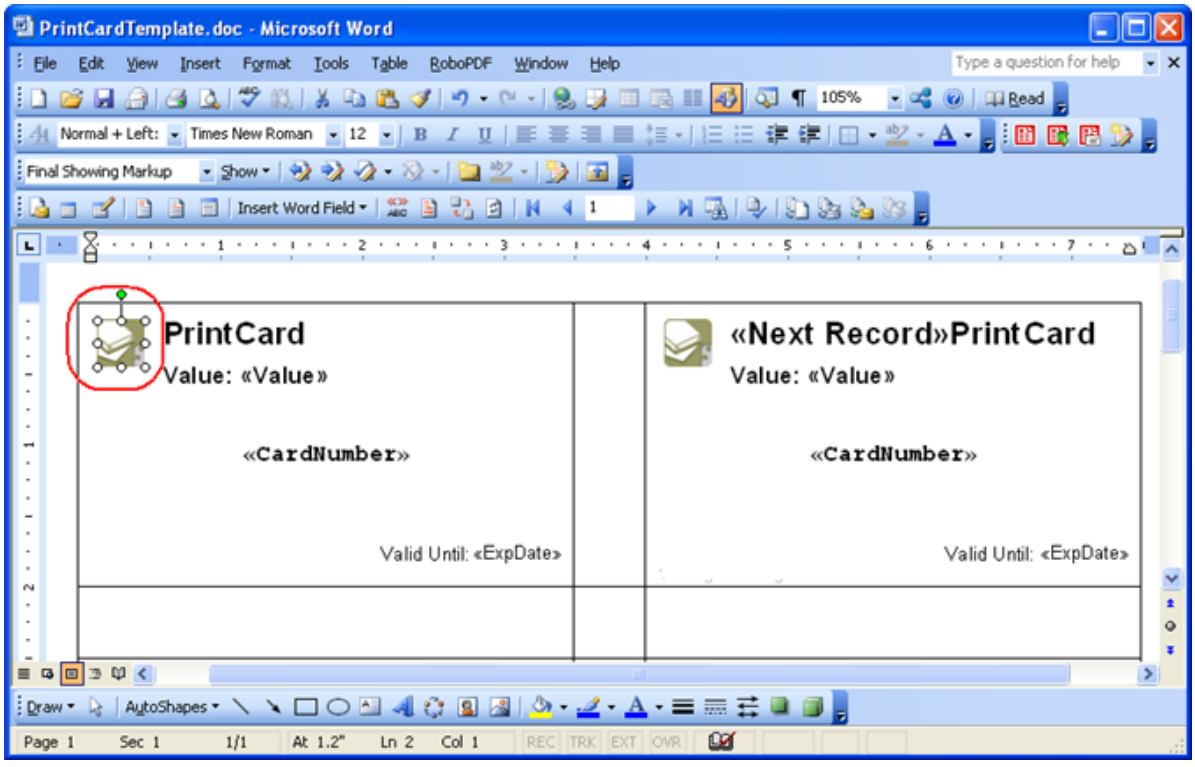


Figure 13.7. Inserting a new logo into a card

6. If using pre-2007 MS Word click on the **Propogate Labels** button on the mail merge tool bar. The new logo should propagate across all cards on the page.

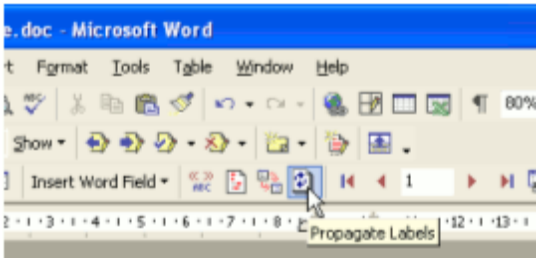


Figure 13.8. Propagate labels button in previous versions of MS Word

In MS Word 2007, click on the **Update Labels** button on the Mailings tool bar.

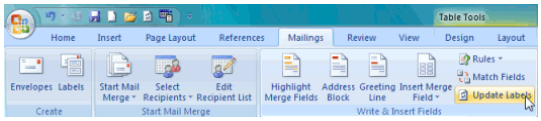


Table Tools
Home Insert Page Layout References Mailings Review View Design Layout
Envelopes Labels
Start Mail Merge Select Recipients Edit Recipient List
Highlight Merge Fields Address Block Greeting Line Insert Merge Field
Rules
Match Fields
Update Labels
Create
Start Mail Merge
Write & Insert Fields

Figure 13.9. Update labels button in MS Word 2007

7. Repeat the steps above to change other working and layout as required. Always change the first card then press the **Propagate Lables** or **Update lables** button to apply the changes to all cards. *IMPORTANT:* Do not accidently delete the special `<<Next Record>>` field as this cause the merge to move to the next card number before printing the next card. Removing this will result in all cards displaying the same card number.
8. Click **File** → **Save** and close Microsoft Word.
9. Test the template by running a batch in the card wizard.

Tip

Design Recommendations:

- Consider changing the logo and adding your organization name
- Change the URL reference to point to your intranet site or event your network/card policy page.
- Provide basic instructions on how to redeem the card or the location of an information page.

13.4. Using a Card

The following information should be distributed to end-users - for example, via the "Print Policy" page on your organization's Intranet site.

To redeem a PrintCard:

1. Purchase a card from the appropriate person or place. The network administrator creates cards specific for your organization. In schools, cards are often sold at the library, general office or school cafeteria.
2. Open a web browser and navigate to the Print-Limit Pro user login page. After logging in, your account status should display.
3. Click on the **Redeem Card** link on the left-hand navigation bar.
4. Enter the *Card Number* in the **Card Number** box and press **Redeem Card**. Take care to enter the number exactly as listed including any dashes (-).
5. If the card's number is valid, the credit as listed on the card will be transferred to your account and this will list in your transaction history.

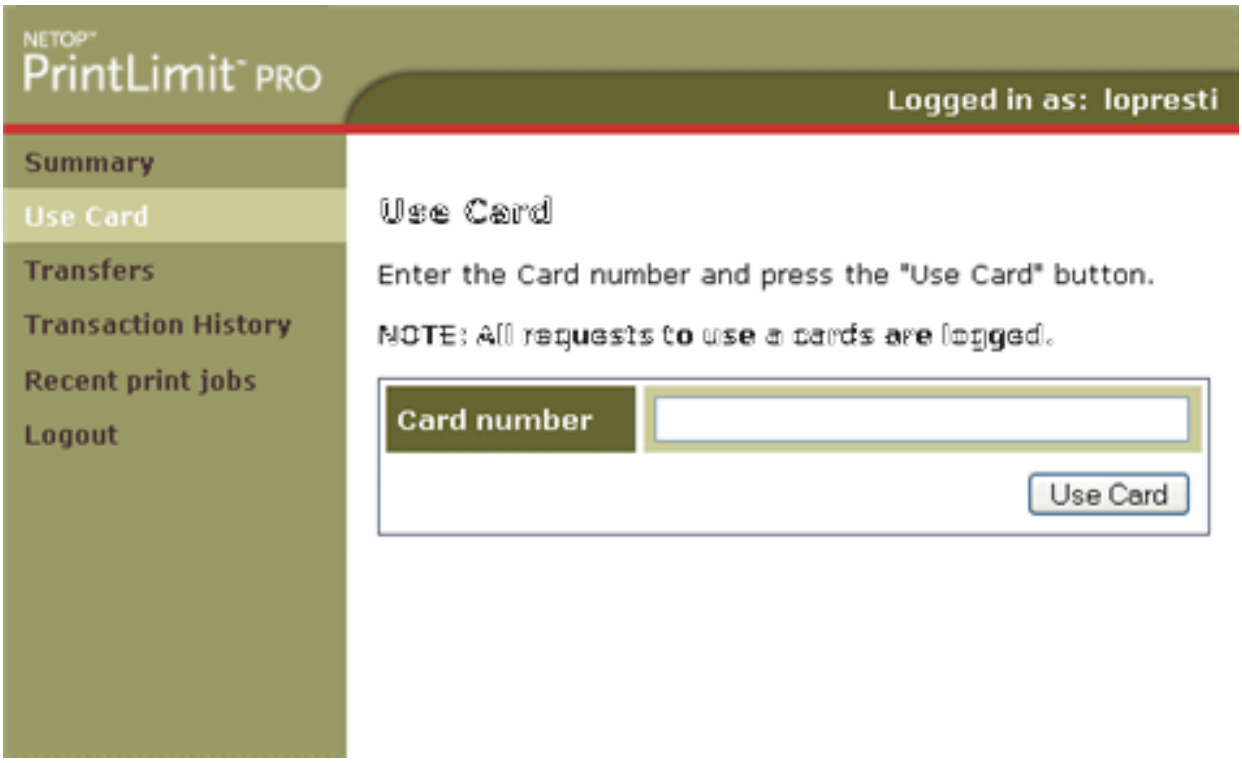


Figure 13.10. Using a card

Tip

To educate the users about redeeming their PrintCard, administrators might find the sample information sheet helpful.

Chapter 14. Configuring Secondary Print Servers and Locally Attached Printers

This section covers the setup of a secondary print server in "Quick Start" format. For a detailed explanation of the underlying technology and what's happening behind the scenes see the subsequent sections.

A secondary print server is a system that directly hosts a printer. In many situations it may be a dedicated server, however a secondary server may also be a desktop system hosting a directly attached USB printer. If this printer is to be controlled and tracked by Print-Limit Pro, a small *monitoring* component needs to be installed. The monitoring component intercepts the local printing and reports this use back to the primary *Application Server*. A secondary server may either be:

1. A server style system hosting many printers.
2. A desktop style system hosting printer(s) also shared to other network users.
3. A desktop style system with the printer used only for local users (not shared).

The monitoring service is also referred to as a *Print Provider* as its task is to provide information back to the main *Application Server*.

The process of setting up a secondary print server, depends on the operating system. Read the section appropriate to the required operating system.

14.1. Configuring a Windows Secondary Print Server

This section describes the process of setting up a secondary Windows print server.

14.1.1. Step 1 - Ensure primary server is set up correctly

Before installing a secondary server you should take some time to ensure the primary server (central application server) is set up and running correctly. If it is not running fine now adding an extra server will only "add an extra variable to the equation" and complicate troubleshooting. Take some time now to verify that the primary server is functioning correctly. For example, verify that:

- Printers on this server are being tracked.
- Users are allowed to login to user pages from their workstations.
- Administrators can access the system.

14.1.2. Step 2 - Ensure firewall software is set to allow access to port 9191

Secondary server needs to communicate (initiate a TCP connection) on port 9191. Administrators should ensure that any firewall software on the primary *Application Server* is not set to block any incoming local network traffic on this port.

14.1.3. Step 3 - Install the print provider

Install the print provider software onto the secondary server. On a Windows server, this is done by selecting the "Secondary Print Server" option in the installation wizard. If the Print-Limit Primary Server software was previously installed on the server it must be uninstalled prior to installing the Secondary Server software.

14.1.4. Step 4 - Configuration

The Print Provider on the secondary server needs to know where the primary server is installed.

1. Open a text editor such as Notepad.
2. Open the file:

```
[app-path]\providers\print\win\print-provider.conf
```

3. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the primary server.
4. Restart the server so the new configuration is detected. To avoid a restart, an administrator may also choose to manually restart the **Print-Limit Print Provider** service.

14.1.5. Step 5 - Test

The secondary server should now be configured. Log into the system as "admin" and verify that the printers are now listed under the Printers section. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

14.1.6. Automated Install

The installation of the secondary server component on Windows systems can be automated. This may be handy when the *Print Provider* component needs to be installed on a number of desktop systems running locally attached printers. For more information see, Section 14.6, “Automating Secondary Server Deployment on Windows”.

14.2. Configuring a Macintosh Secondary Print Server

This section describes the process of setting up a secondary Mac print server. The primary *Application Server* may either be a Windows, Mac or a Linux basis system. Print-Limit Pro has full support for "mixed" or heterogeneous printing environments.

14.2.1. Step 1 - Ensure primary server is set up correctly

Before installing a secondary server you should take some time to ensure the primary server (central application server) is set up and running correctly. If it is not running fine now adding an extra server will only "add an extra variable to the equation" and complicate troubleshooting. Take some time now to verify that the primary server is functioning correctly. For example, verify that:

- Printers on this server are being tracked.
- Users are allowed top login to user pages from their workstations.
- Administrators can access the system.

14.2.2. Step 2 - Ensure firewall software is set to allow access to port 9191

Secondary server needs to communicate (initiate a TCP connection) on port 9191. Administrators should ensure that any firewall software on the primary *Application Server* is not set to block any incoming local network traffic on this port.

14.2.3. Step 3 - Create the host user account

Print-Limit Pro runs under a non-privileged user account called "printlimit". This invisible system account is created automatically upon first install. Advanced system administrators may however have a preference to create this account manually. If you fall into this category, create the `printlimit` account now prior to installation.

14.2.4. Step 4 - Install the print provider

Install the print provider software onto the secondary server. Download the latest Mac DMG disk image and execute the contained installer called `Print-Limit Pro Secondary Server Installation.pkg`.

14.2.5. Step 5 - Configuration

The Print Provider on the secondary server needs to know where the primary server is installed. The installer may open the appropriate configuration file after the install completes.

1. Open a text editor such as TextEdit.
2. Open the file:

   `[app-path]/providers/print/ mac/print-provider.conf`
3. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the primary server.
4. Save the file and exit the text editor.

Double-click on the command script `/Applications/Print-Limit Pro/Control Printer Monitoring.command`, and enable monitoring on the appropriate printers.

14.2.6. Step 6 - Test

The secondary server should now be configured. Log into the system as "admin" and verify that the printers are now listed under the Printers section. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

14.3. Configuring a Linux or Novell iPrint Secondary Print Server

This section describes the process of setting up a secondary print server on a Linux system. The primary *Application Server* may either be a Windows, Mac, Novell or a Linux based system. Print-Limit Pro has full support for "mixed" or heterogeneous printing environments.

14.3.1. Step 1 - Ensure primary server is set up correctly

Before installing a secondary server you should take some time to ensure the primary server (central Application Server) is set up and running correctly. If it is not running fine now, adding an extra server will only "add an extra variable to the equation" and complicate troubleshooting. Take some time now to verify that the primary server is functioning correctly. For example, verify that:

- Printers on this server are being tracked.
- Users are allowed user login to user pages from their workstations.
- Administrators can access the system.

14.3.2. Step 2 - Ensure firewall software is set to allow access to port 9191

Secondary server needs to communicate (initiate a TCP connection) on port 9191. Administrators should ensure that any firewall software on the primary *Application Server* is not set to block any incoming local network traffic on this port. A good way to test, is to open a browser on the planned secondary server and confirm you can access the administration web interface on port 9191.

14.3.3. Step 3 - Account setup

On the secondary server, create a user account called `printlimit`. The `printlimit` user's home directory should be set to the desired install location. This is normally `/home/printlimit`. The method of creating this account is the same as that used for the primary server setup. See Chapter 2, *Installation* for more details if required.

14.3.4. Step 4 - Install the Print Provider

Important

The instructions below assume `i686` architecture. If your system OS is 64-bit, replace `i686` with `x64` in all file paths.

Install the *Print Provider* software onto the secondary server by copying all files and directories from the primary

Application Server's directory:

```
[app_dir]/providers/print/linux-i686/*
```

To the equivalent location on the secondary server:

```
/home/printlimit/providers/print/linux-i686/
```

on the secondary server. Perform the copy operation as the `printlimit` user so that files are owned by the `printlimit` user. You may use any method to copy the files, including over the network or via a USB key. If the primary server is also Linux, the simplest way would be use Secure Copy (`scp`) as follows:

```
shell> su - printlimit
shell> mkdir -p providers/print
shell> cd providers/print
shell> scp -r primary.server.name:/home/printlimit/providers/print/* .
```

After the copy operation is performed, execute the `setperms` and `roottasks` scripts as *root*:

```
shell> su - root
shell> sh ~printlimit/providers/print/linux-i686/setperms
shell> sh ~printlimit/providers/print/linux-i686/roottasks
```

14.3.5. Step 5 - Configuration

The *Print Provider* on the secondary server needs to know where the primary server is installed (e.g. Its IP address).

1. Open the file:

   ```
   /home/printlimit/providers/print/linux-i686/print-provider.conf
   ```

   in a text editor.
2. Locate the line starting with `ApplicationServer=` and change `localhost` to the name or IP address of the primary server.

The binaries copied in step 4 now need to be integrated into the CUPS, Samba or Novell iPrint print queues. This process is detailed in Section 21.1.3, “Linux Print Queue Integration” and Section 2.3.5, “Step 5 - Printer/iPrint Configuration”.

14.3.6. Step 6 - Test

The secondary server should now be configured. Perform some test printing on all of this secondary server's printers. Log into the system as "admin" and verify that the printers are now listed under the Printers section. Perform a multi-page test print on each printer and verify that print jobs are tracked correctly.

14.4. Print Monitoring Architecture

This section covers Print-Limit Pro print monitoring architecture from a technical perspective. Knowledge of advanced networking is expected.

Print-Limit Pro is designed using the latest software design principles. An important design principle used is Service Oriented Architecture (SOA). Print-Limit Pro divides key operational areas into components. These components communicate using an XML Web Services standard. Two of the main services are:

Service/Component	Description
The Application Server	The central logic service responsible calculating user costs and providing the web and admin interface.
Print Provider Service	A service responsible for monitoring and analyzing print jobs and reporting this information using XML Web Services to the application server.

Table 14.1. Print-Limit Pro services/components

In a single server setup, an administrator does not need to be concerned with the two components as they automatically act as one (it's only noticeable in that two processes are running on the server). On a multi-server/system environment a deeper understanding of the architecture is required.

14.5. Multiple Print Servers

Many large networks, or even smaller networks with a legacy design, may be composed of more than one print server. Reasons for separating printers across servers/systems include:

- Legacy design - “That's the way the previous admin set it up.”
- Networks with 100 printers or more may need multiple servers to spread the printing load.
- Networks spanning multiple physical sites or subnets may have separate servers minimize cross-site network traffic.
- Servers may exist to support different operating systems
- A local desktop printer attached to a system is also a remote *print server*.

One of the servers on the network needs to be nominated as the primary server. This system runs the *Application Server* software responsible for providing the user interface, storing the data, and managing the application logic. The system nominated for this task is usually a print server (but could be any server). It needs to be a system with spare capacity to run the Print-Limit Pro application server software. This system should have good performance, have at least 500 Mb of free hard-disk space, and be included in an off-disk backup routine.

Other print servers are known as secondary servers. These servers run the Print Provider component and communicate back to the central server. The following diagram illustrates this setup.

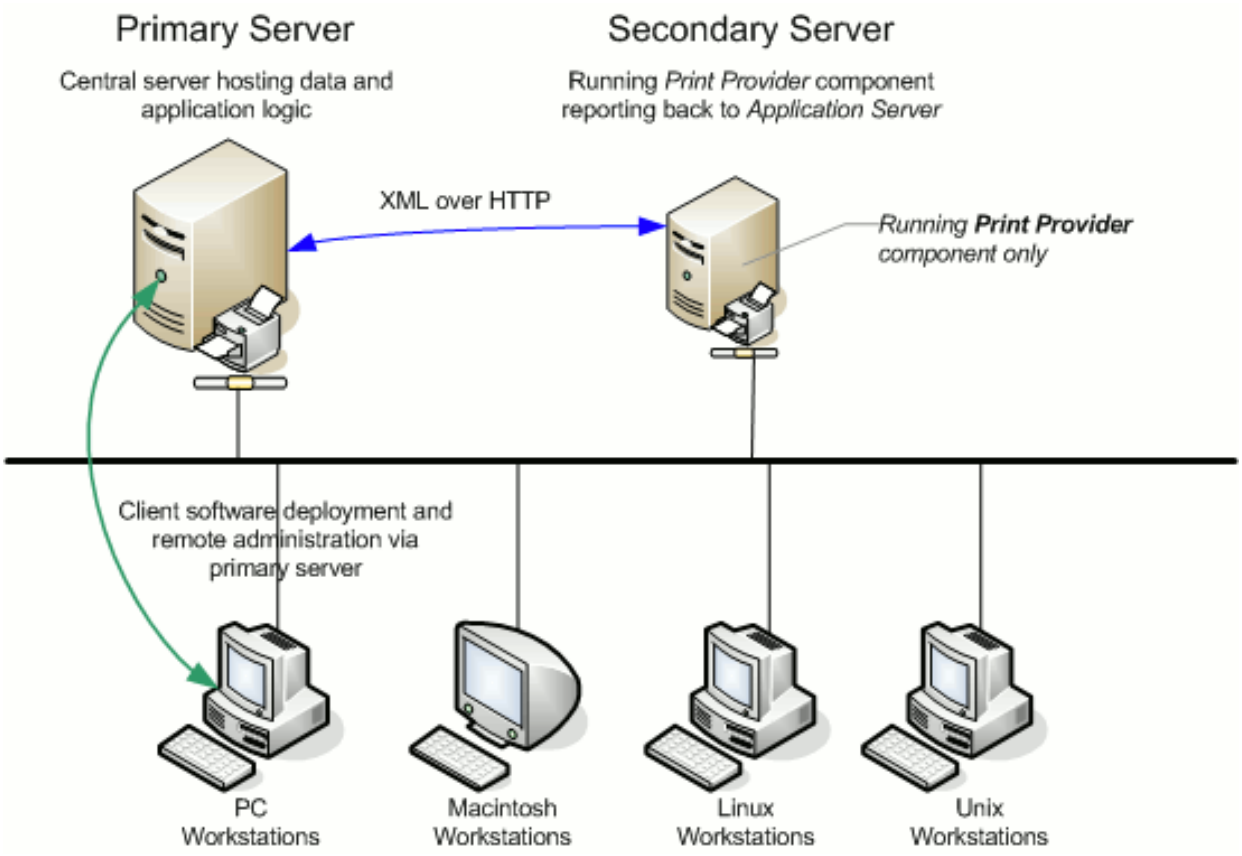

Primary Server
Central server hosting data and application logic
Secondary Server
Running Print Provider component reporting back to Application Server
XML over HTTP
Running Print Provider component only
Client software deployment and remote administration via primary server
PC Workstations
Macintosh Workstations
Linux Workstations
Unix Workstations

Figure 14.1. Secondary server reporting back to primary server (application server)

When a client prints to a secondary server, the Print Provider intercepts the print job and forwards the information to the central server for processing. Communication is via XML Web Services over HTTP on the Print-Limit Application Server's nominated port (normally port 9191). The web services protocol is specifically designed to facilitate easy firewalling, scalability, and will work over a wide range of network speeds.

Print-Limit Pro Service Oriented Architecture offers many advantages for network administrators including:

- Secondary servers run the minimum amount of software
- Communication between servers uses minimal bandwidth. Physically separated servers connected via WAN links, VPNs or other slow links are supported with minimal or no impact on printing performance.
- All data, logging and configuration information is stored on one single central server facilitating central backup from one location.
- Management may be conducted centrally from one location.

Print-Limit Pro's SOA design allows advanced setups including:

- Decentralized deployment
- Separation of concern (servers dedicated to separate tasks such as database server, application server and print server)
- Options to remove points of failure via clustering or fail-over

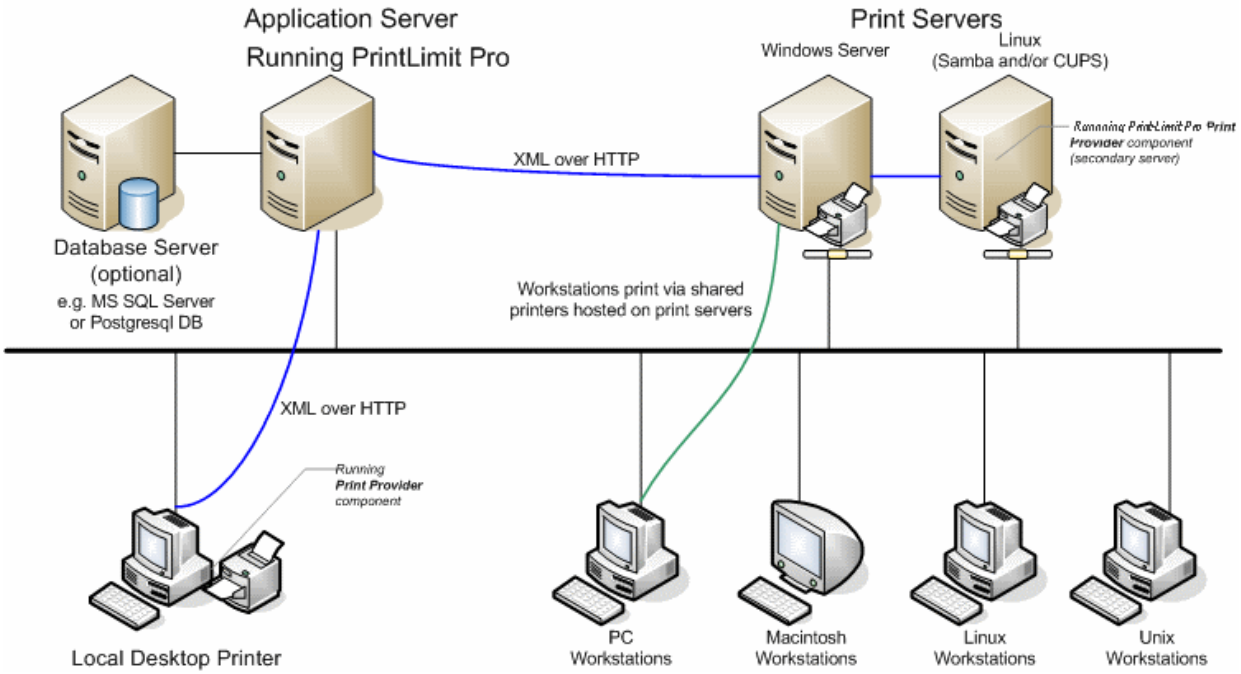


Figure 14.2. Print-Limit Pro Architecture - an advanced configuration

14.6. Automating Secondary Server Deployment on Windows

The secondary server installation process can also be automated via command line switches issued to the installer program. This may be useful when there is a need to install the *Print Provider* on a number of desktop systems hosting local attached printers.

To automate the installation:

1. Copy the windows installer program, `plp-setup.exe`, into a directory accessible to the target systems (i.e. A network share or mapped drive).
2. Copy the `print-provider.conf` file from main server. This file is located at `[app-path]/providers/print/win`. Place the file in the *same* directory as the install program (as performed in step 1.)
3. Edit the `print-provider.conf` file and define the correct server name or IP address of the main application server in the line starting with `ApplicationServer=` .
4. Use a batch file or equivalent to start the install program as follows:

```
plp-setup.exe /TYPE=secondary_print /SILENT
```

Note: The installer requires administrator level - needed to install a system service.

Note:

- The executable name of the installer program may vary depending on the version.
- Replacing the `/SILENT` option with `/VERYSILENT` will suppress all visual output during the installation process.
- The copy of the `print-provider.conf` file is used during the install process to ensure the installation is aware of the location of the main application server.
- For a full list of command-line arguments, see Section A.7, “Automating / Streamlining Installation on Windows”.

Chapter 15. Advanced Customization

Print-Limit Pro is an important part of network infrastructure at many thousands of organizations. Having the ability to seamlessly integrate Print-Limit into an existing network is important. There are a number of ways to ensure end-users see the system as part of the network rather than an add-on. These include:

- Changing the URL or link on the User Client window
- Customizing the look and feel of the use web pages
- Using the Print-Limit Pro back-end data in other procedures such as custom reports

This section covers some of the customization options available within Print-Limit Pro. For general information about the user client, see Section 5.2, “User Client”.

15.1. Customizing the User Client Tool window

The `pc-client.exe` program displays a small window highlighting the current logged in user's current account balance. This window contains two links. One called **Details** that takes the user to the **User Pages** login. The other defaults to the Netop website. The link to the Netop website can be replaced. Some suggestions include linking to your organization's website or intranet site, or linking to a page containing your organization's network usage policy. The logo used on the window can also be customized.

To change the link on the User Client window:

1. Login to the system as an administrator (e.g. the built-in `admin` account).
2. Navigate to the **Options** section.
3. Scroll down to the **Client software** section.
4. Select the option **Change link on client software**.
5. Enter a **Destination URL** pointing to your new destination. The link should be a complete URL including the `http://` component. e.g. `http://www.myorganization.com/printpolicy.htm`.
6. Under **Link text** enter the text that should be displayed. e.g. `Print Policy`.
7. Press the **Apply** button to the right to apply the changes.
8. The next time the client tool is started on one of the workstations, the new link will be displayed.

Figure 15.1. Customizing the user client link

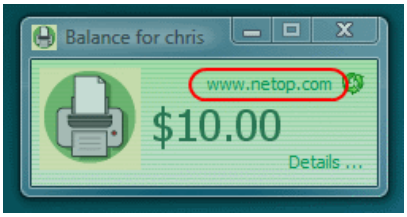


Figure 15.2. Customized user client link

There are other configuration keys that allow an administrator to customize the user client for their organization. The table below outlines all of the client customization config keys available. The value of these config keys can be updated using the Config Editor. Please see Section 12.9, “Using the Config Editor” to find out how to change config keys.

Config name	Description
client.config.show-link	Indicates whether the link at the top of the user client should be displayed. To display set the value to `Y`, to hide set the value to `N`.
client.config.show-details-link	Indicates whether the "Details" link that points to the user web interface is displayed. To display the link set the value to `Y`, to hide set the value to `N`.
client.config.show-document-cost	Determines whether to show the document cost to the user in print popup notifications. To show the cost set the value to `Y`, to hide set the value to `N`.

Table 15.1. User Client Customization Config Keys

The logo used on the User Client balance window and the account selection dialog can also be customized by placing a file called `client-logo.png` in the directory `[app-path]/client/[platform]` - the same directory as the executable. The image must satisfy the following requirements:

- Comply to the PNG (Portable network graphic) format.
- A size of 64px by 64px.
- Display correctly on different background colors (make use of transparencies or alpha channels).

On the Apple Mac platform the process is a little more involved. The image needs to be placed inside the App package at: `PCClient.app/Content/Resources`. To access this directory, Option-click on the PCClient icon and select **Show package contents...**.

The user client can also be configured by passing command-line parameters to the program. This is described in Section A.5, “User Client Options”.

15.2. Limiting the list of interface languages/translations

Print-Limit Pro has been translated into a number of languages. Some of these translations are complete and done at an official level while others are partial and done by Print-Limit Pro users working in cooperation. Many of these languages may not be appropriate for your environment and it may make sense to limit the list - the user selects the language in the drop-down list on the web login screen. The list of available languages can be set by changing config key `language.available` to a comma-separated list of ISO language codes. The list should be a subset of:

```
en,de
```

For example setting `language.available` to `en,de` would limit the list to English and German only.

Please see Section 12.9, “Using the Config Editor” to find out how to change config keys.

15.3. Customizing the User web pages

15.3.1. Look & Feel

The user pages display information about the user's account and provide access to features such as PrintCards. The visual design of these pages can be tailored to make them fit into the *look and feel* of an existing internet or intranet site. This gives the pages an official look ensuring your users see the system as an important part of your organization's network.

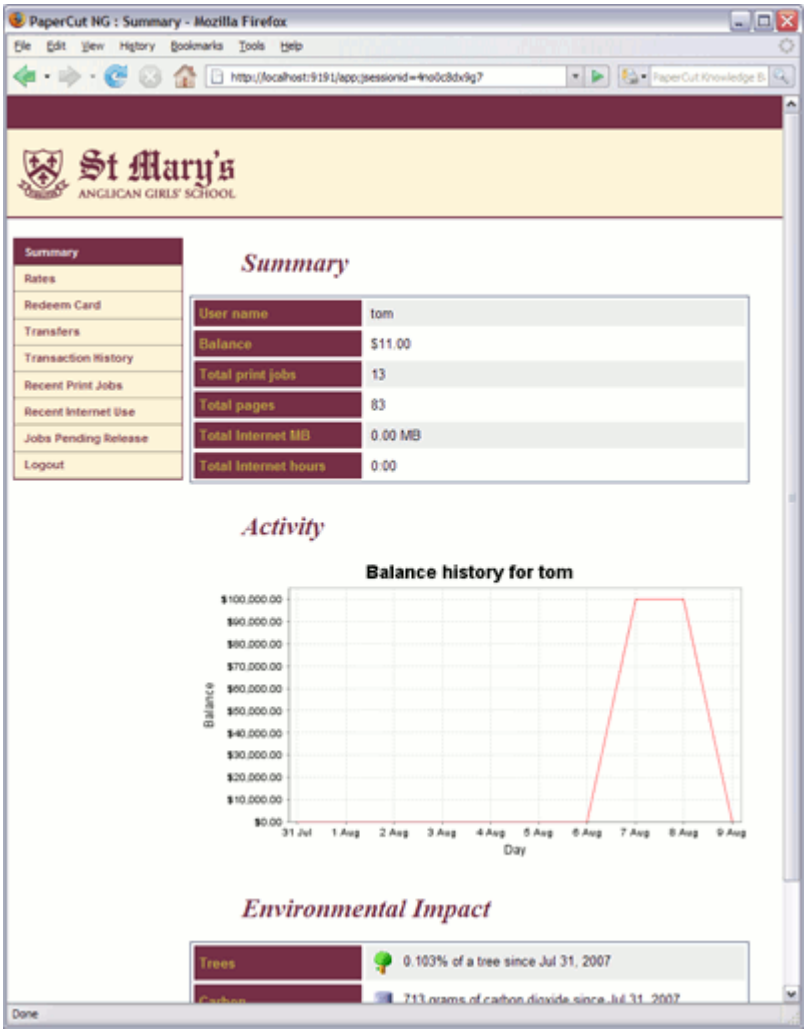


Figure 15.3. A customized end-user web designed for St Mary's Anglican Girls School

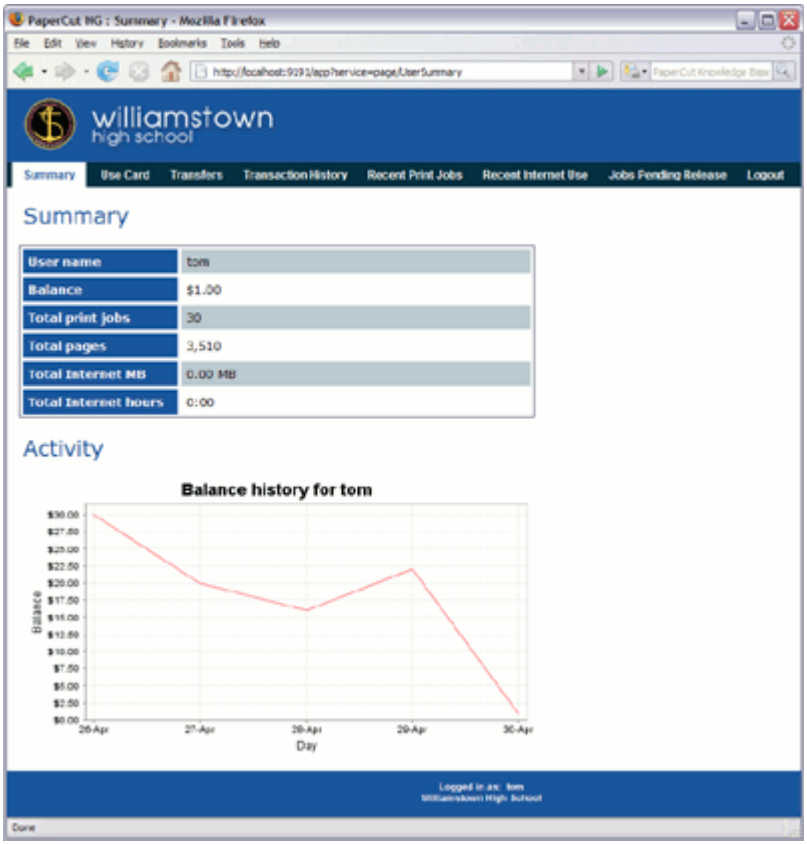


Figure 15.4. A customized end-user web designed for Williamstown High School

Netop offers a service where their developers will undertake design work based on an existing website. If you would like assistance with the customization, please email the Netop support team.

Organizations whose staff have good to advanced HTML experience may choose to customize the pages in-house.

The design of the user pages is controlled via HTML "include" files for the header and footer areas of the page, with page styling controlled via Cascading Style Sheets (CSS). Placing the following files in the Print-Limit Pro directory structure at `[app-path]/server/custom/web` overrides page layout and style.

Filename	Description
`user.css`	If this file exists, the contents of `user.css` is included as an overriding stylesheet. Styles in this file can be used to define fonts, colors and sizes.
`header.inc`	If the header include file exists, the HTML in the header area of the pages is replaced with the contents of the file.
`footer.inc`	If the footer include file exists, the HTML in the footer area of the page is replaced with the contents of the file.
`login-logo.png`	If this file exists, the logo on the web-based login page is replaced with the supplied image. The file should be an image of size 250px by 64px in PNG format.

Table 15.2. Files used to customize the user web pages

Tip

Any custom content placed in `[app-path]/server/custom/web/`, such as additional images, can be accessed via a URL beginning with `/custom/`. For example if a file named `header.jpeg` is placed in `[app-path]/server/custom/web/` it can be accessed via the URL `/custom/header.jpeg`.

15.3.2. Login Instructions

Some organizations may benefit from providing additional login instructions to users. This can be useful for explaining which username or password to use (in the case there are multiple logins or passwords at the site).

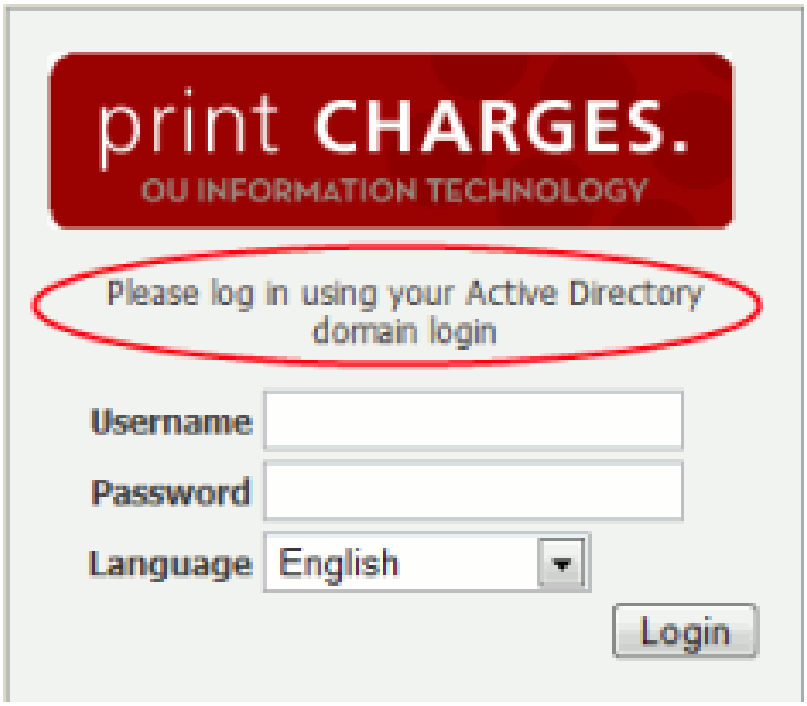


Figure 15.5. Login Page with custom instructions

A custom message may be displayed on the login page using the following config key:

Config name	Description
display.login-instructions	A message to be displayed on the login screen, above the username and password fields.

Table 15.3. Custom login instructions config key

Please see Section 12.9, “Using the Config Editor” for more information about changing the value of config keys.

15.3.3. Custom Printer Maps for Web Print

A graphical map or other custom content may be used instead of the default printer selection list in the Web Print wizard. For more information see Section 19.5.2, “Designing Printer Maps / Custom Printer Selection Lists”.

15.4. Customizing the Administration Web Interface

As the Print-Limit Pro administration interface is designed for use by administrators there generally isn't the need to customize it to the extent of the user web interface (for information about customizing the user web interface see Section 15.3, “Customizing the User web pages”). An organization logo or other image can be displayed in the header of the administration interface however. The available customizations are:

- Add an image of your choice to the right of the main administration logo

Logos can be added to customize the look of the admin interface. These can be customized by placing the following files in the Print-Limit Pro directory structure at `[app-path]/server/custom/web/`.

Filename	Description
`admin-logo.png`	If this image exists it will be displayed to the right of the existing application logo. The image must be in PNG format and for best results should be sized 250px by 42px. For best results, the file should be an image of size 250px by 42px in PNG format.

Table 15.4. Files used to customize the administration web pages

15.5. Customizing Report Headers

The standard Print-Limit Pro report header logo can be replaced with an alternate image. This can be used to include an organization logo and address for example, which may be useful when attaching reports to customer invoices, or just to make reports look more professional.

Figure 15.6. Example custom report header usage

To use a custom report header logo, place an image at `[app-path]/server/custom/web/report-header.png`. The image should be 250px by 80px in PNG format.

15.6. Data Access and Custom Reports

The default Print-Limit Pro installation stores data in an internal database. For the interested person, the database is Apache Derby - an open source database written by IBM and based on their DB2 Cloudscape Database. The internal database is optimized for embedded use, is very robust, ACID compliant and scales well. The internal database however is not designed for multi-application access. To access the data from an exteral source such as a reporting program, you'll need to consider running Print-Limit Pro on an external database (RDMS) designed for multi-user and multi-applicaiton user access. Common database solutions include Microsoft SQL Server, Oracle, PostgreSQL and MySQL. For more information see Chapter 18, *Deployment on an External Database (RDBMS)*.

The Print-Limit Pro data structure is relatively simple and people with Crystal Reports, MS Access or SQL experience should have no problems extracting data or written custom reports. Report developers should keep in mind:

- Only access the data in a read-only mode. Modifying data directly underneath the application may cause unpredictable behavior.
- Always test any custom reports after an upgrade as the underlying data format may have changed. Netop developers try to minimize data structure changes but they are expected to occur in major upgrades.

15.6.1. Plain Text Print Log

In addition to storing print log information in the database, a real-time, plain text log is also written into the directory:

```
[app-path]/server/logs/print-logs
```

The log file is in a tab delimited format and a new log is created for each day. Files are named with the format `printlog_yyyy_mm_dd.log` and files are archived for 30-days. The tab delimited file can easily be imported into programs such as Microsoft Excel, Microsoft Access or other database.

Field	Description
Field 1	Date in format `yyyy-MM-dd\th:mm:ss a/p`
Field 2	Server Name
Field 3	Printer Name
Field 4	User who printed the document
Field 5	Account charged (usually the user's personal account but could be a shared account)
Field 6	Client/Workstation Name
Field 7	Document name
Field 8	Total number of pages
Field 9	Total number of color pages
Field 10	Number of copies (this has already been used to calculate the total pages).
Field 11	Cost
Field 12	Duplex status
Field 13	Grayscale status (Color mode)
Field 14	Paper Size (e.g. Letter, A4)
Field 15	Paper Height in Millimetres (divide by 24.5 for inches)
Field 16	Paper Width in Millimetres (divide by 24.5 for inches)
Field 17	Print job size in KB
Field 18	Printer Language
Field 19	Cost Adjustments (comma separated)
Field 21	Job Type (PRINT/COPY)

Table 15.5. Text print log file format

15.7. Automation and Scripting

Print-Limit Pro provides a detailed set of server commands and Web Services API's. These services may be used to automate common operations and management tasks. Some examples of where an administrator may choose to use scripting/automation include:

- Automate tasks such as backups and domain user/group synchronization.
- Integrate account creation and management into existing scripts or processes.

- Manage account balances and transactions outside the application.

The automation and scripting tools are written for software and script developers. It is expected that readers intending on using these tools are comfortable with developing system management and server monitoring programs.

The `server-command` and Web Services API's are included as standard with Print-Limit Pro. More information on using these tools is detailed in Appendix A, *Tools - database, server-command scripting, and APIs (Advanced)* in Section A.1, “Server Commands (server-command)” and Section A.3, “The XML Web Services API”.

15.8. Custom User Directory Information Providers

Print-Limit Pro is a modern application designed with a modern architecture. It supports plug-ins and extensions at a number of different levels. One such layer is the User Directory source. Organizations with very complex domains, such as those seen in large universities, can be accommodated either with the standard options, or if the standard options are not sufficient, via a custom plug-in.

For example, a University may have multiple domains, one running Active Directory and the other LDAP/NIS. A custom plug-in could support this by first querying Domain A, and if the user is not found, the query Domain B via LDAP. The Print-Limit Pro development team is happy to provide API documentation and sample source code to assist organizations with custom requirements.

For some working examples available in your current installation, look in: `[app-path]/server/bin/linux-[x64|i686]/sambauserdir`, `[app-path]/server/bin/linux-[x64|i686]/authsamba` and `[app-path]/server/bin/linux-[x64|i686]/src/`.

Chapter 16. Advanced Scripting (Print Scripting)

16.1. Introduction

Print-Limit's advanced scripting interface is a powerful and flexible feature that can be used to define and fine tune your printing policy. While there are many features that can be enabled by ticking checkboxes and changing options in the admin interface, scripting your own behavior introduces a whole new level of customization.

The functionality made possible by scripting is varied and is constantly being extended based on customer demand. Some common uses include:

- Displaying a popup message if a user forgets to select duplex on large jobs.
- Showing a dialog that displays environmental impact statistics about a user's print job such as the amount of carbon dioxide equivalent greenhouse gases produced.
- Prompting the user to confirm large jobs before printing.
- Automatically routing large jobs to more efficient high volume printers.

All of the above is possible by writing a small script directly into a code editor in the admin interface. In fact, the above functionality is a pre-built recipe ready to use.

Other usage examples include:

- Requesting job data/security classification.
- Giving discounts during off-peak times.
- Charging printing to departments during class-time.
- Displaying warning messages under selected conditions.
- and many, many more.

At a high level, advanced scripting provides the ability to:

- *Adapt* logic based on print job attributes such as cost, pages, document name, time, etc.
- *Modify* job attributes and behavior such as routing the job to another printer, influencing job cost and account charged, and appending metadata such as comments.
- *Interact* with end users via client messages and pop-ups/dialog boxes.

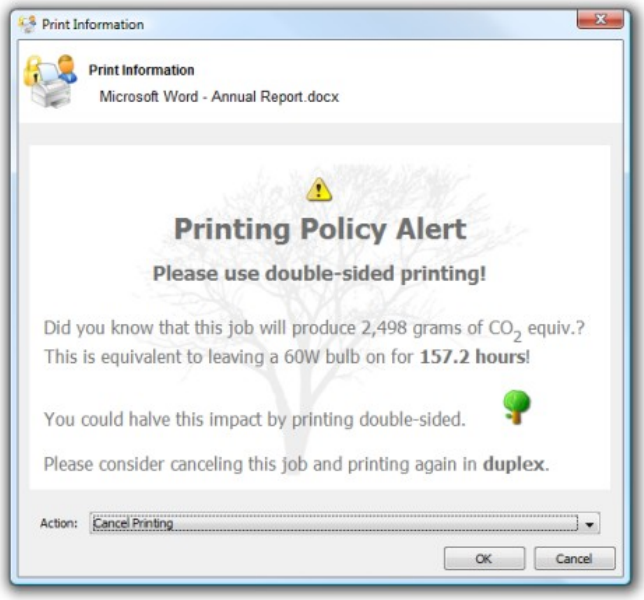
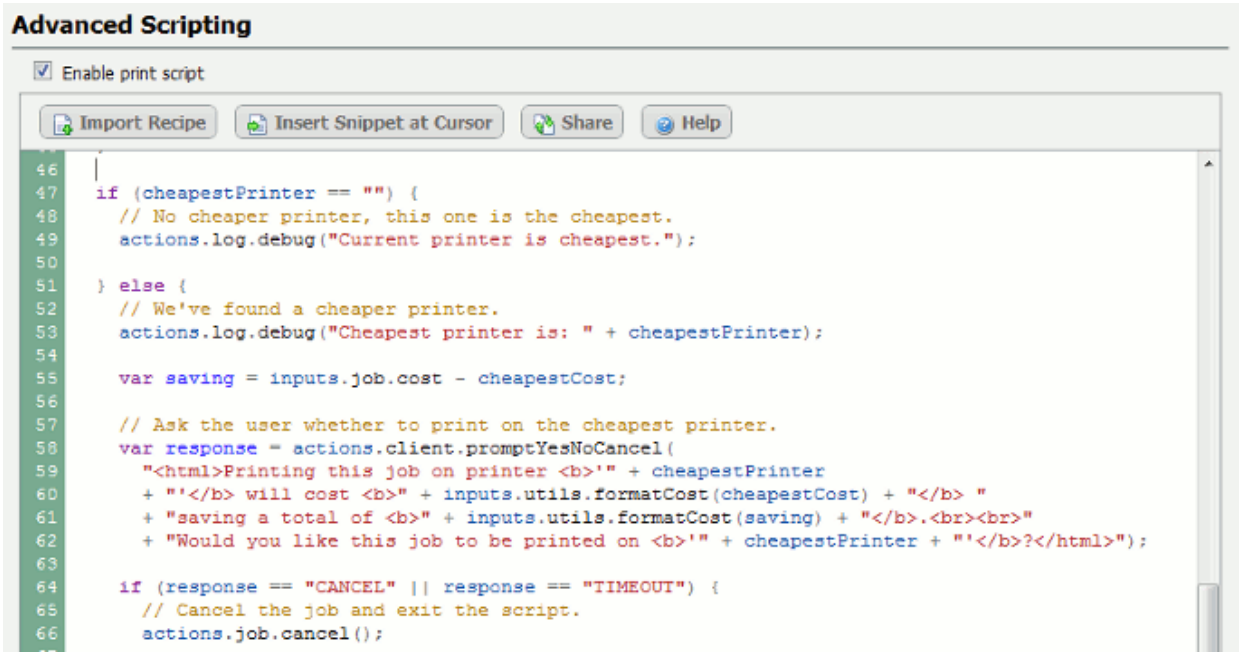

Print Information
Print Information
Microsoft Word - Annual Report.docx
Printing Policy Alert
Please use double-sided printing!
Did you know that this job will produce 2,498 grams of CO_2 equiv.?
This is equivalent to leaving a 60W bulb on for 157.2 hours!
You could halve this impact by printing double-sided.
Please consider canceling this job and printing again in duplex.
Action:
Cancel Printing
OK
Cancel

Figure 16.1. Print Policy Pop-up (as implemented in the Print Policy Recipe)

16.1.1. Prerequisites

Writing print scripts brings many possibilities but also introduces the possibility that writing a buggy print script results in unexpected behavior. Previous experience with scripting or programming is strongly recommended. Print-Limit Pro does provide a number of tools to assist with script development, however, including:

- A mini JavaScript editor with basic error checking and syntax highlighting.
- Quick access to a code cookbook containing dozens of best-practice recipes.
- Pre-canned "code snippets" demonstrating the use of key functions.
- Simple debugging tools such as logging and runtime error reporting.


Advanced Scripting
Enable print script
Import Recipe
Insert Snippet at Cursor
Share
Help
if (cheapestPrinter == "") {
// No cheaper printer, this one is the cheapest.
actions.log.debug("Current printer is cheapest.");
} else {
// We've found a cheaper printer.
actions.log.debug("Cheapest printer is: " + cheapestPrinter);
var saving = inputs.job.cost - cheapestCost;
// Ask the user whether to print on the cheapest printer.
var response = actions.client.promptYesNoCancel(
"<html>Printing this job on printer '" + cheapestPrinter
+ "' will cost " + inputs.utils.formatCost(cheapestCost) + " "
+ "saving a total of " + inputs.utils.formatCost(saving) + ".

"
+ "Would you like this job to be printed on '" + cheapestPrinter + "'?</html>");
if (response == "CANCEL" || response == "TIMEOUT") {
// Cancel the job and exit the script.
actions.job.cancel();

Figure 16.2. The print script editor showing a sample script

All of Print-Limit Pro's advanced scripts are written using the world's most popular scripting language, JavaScript (also known as ECMA-262 ECMAScript... apparently ;).

Note

Why JavaScript?

JavaScript was selected as Print-Limit Pro's scripting language after careful consultation with the existing user base. JavaScript was the language common to system administrators across all platforms (Windows, Mac and Linux). Its popularity in HTML programming also meant most administrators already had extensive exposure to the language.

Internally Print-Limit uses the Rhino scripting engine maintained by Mozilla.org, makers of the popular Firefox browser. It is highly performant and allows Print-Limit Pro to leverage advanced scripting without compromising system scalability. This is done using advanced techniques such as just-in-time compilation.

16.1.2. How to Use Print Scripts

Print scripts are segments of code that are run whenever a new print job arrives in the queue. The script is defined using the concept of a "hook". A hook is a JavaScript function (e.g. `function printJobHook(inputs, actions) { }`) that is called for each new job. Your print script defines this method, its behavior and its actions.

Print scripts are defined via **Printers** → **[select printer]** → **Scripting**.

All scripts are defined on a per printer basis allowing each printer to have its own logic (although it is possible to share/copy a common script between printers, see Section 7.3, “Copying Printer Settings”). Script code is entered into the editor and once completed can be saved using the **Apply** button. Errors raised by the script are displayed on this page.

Tip

One good way of experimenting with print scripting is to apply your script initially on a test printer (or fake print queue such as a print queue pointing to an unused LPT port). This will allow you to test and experiment, and when the logic is right, copy/deploy across to other live printers.

Error messages are classed into two groups:

- *Syntax errors* - these are detected and displayed when a script is applied. The script will not save until all syntax errors are addressed.

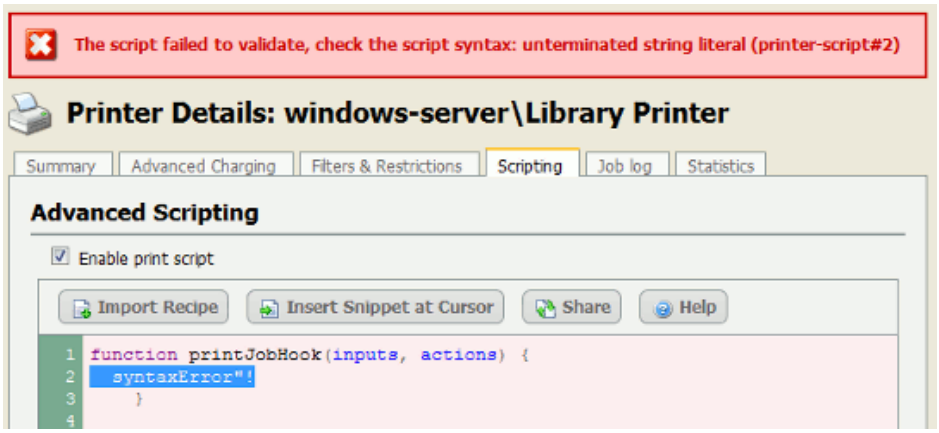


Figure 16.3. Example syntax error in a print script

- *Runtime errors* - these are errors that only occur when a script is executed for a print job. Runtime errors are also listed on the **Scripting** tab in red. You may need to refresh the page to see runtime errors. Runtime errors are also logged and can be found on the **App Log** tab.

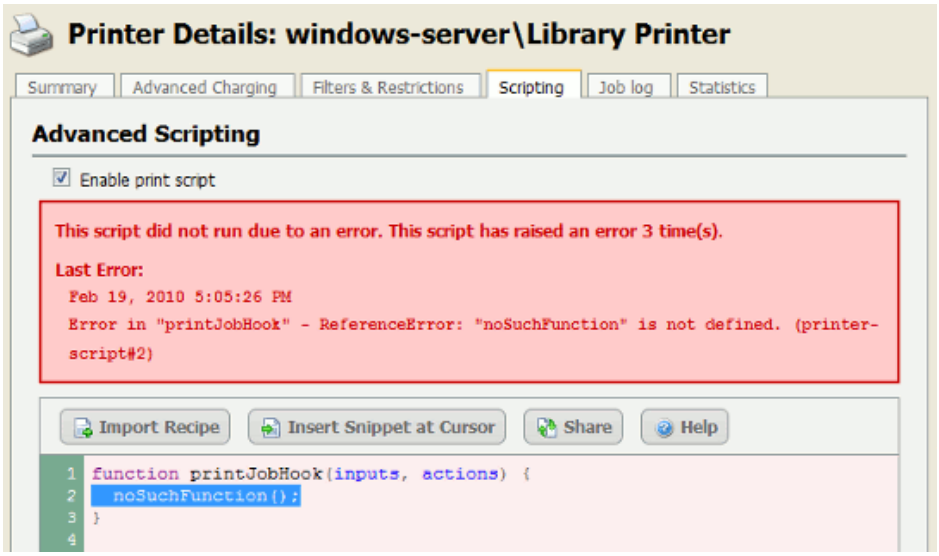


Figure 16.4. Example runtime error in a print script

Where possible the error message will indicate the line number on which the error was found and the relevant line

will be highlighted.

The best way to start out writing print scripts is to first experiment with some of the *recipes*. Try importing a recipe on a test/non-production printer using the **Import Recipe** button. Recipes demonstrate best practice and should be considered as a starting point for development of your own scripts.

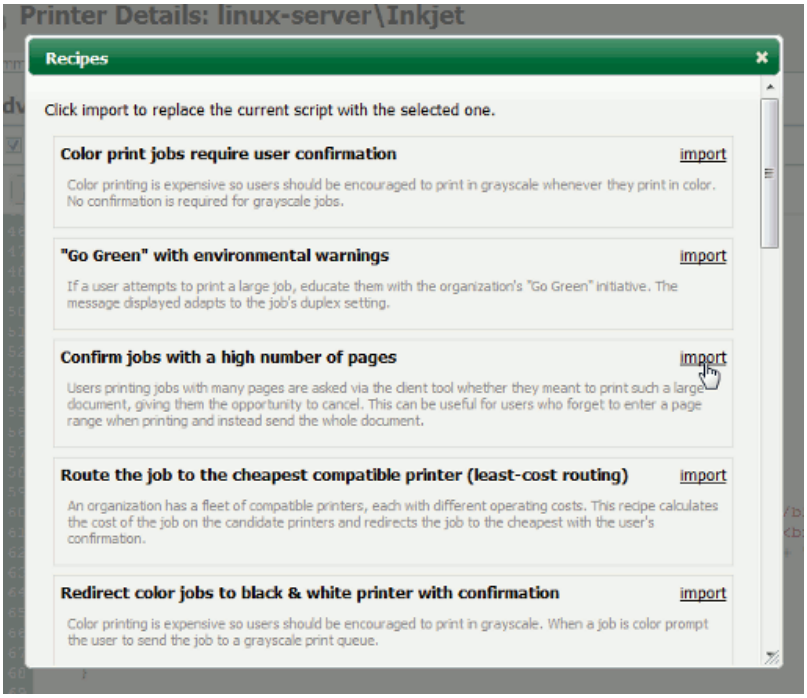

Printer Details: linux-server\Inkjet
Recipes
Click import to replace the current script with the selected one.
Color print jobs require user confirmation
import
Color printing is expensive so users should be encouraged to print in grayscale whenever they print in color. No confirmation is required for grayscale jobs.
"Go Green" with environmental warnings
import
If a user attempts to print a large job, educate them with the organization's "Go Green" initiative. The message displayed adapts to the job's duplex setting.
Confirm jobs with a high number of pages
import
Users printing jobs with many pages are asked via the client tool whether they meant to print such a large document, giving them the opportunity to cancel. This can be useful for users who forget to enter a page range when printing and instead send the whole document.
Route the job to the cheapest compatible printer (least-cost routing)
import
An organization has a fleet of compatible printers, each with different operating costs. This recipe calculates the cost of the job on the candidate printers and redirects the job to the cheapest with the user's confirmation.
Redirect color jobs to black & white printer with confirmation
import
Color printing is expensive so users should be encouraged to print in grayscale. When a job is color prompt the user to send the job to a grayscale print queue.

Figure 16.5. Importing a print script recipe

Code *snippets* are small code fragments that demonstrate how to use make best use of the scripting API (inputs, functions and methods). Consider using snippets as a base for adding functionality to your script. Snippets are inserted at the current cursor location and accessed via the **Insert Snippet at Cursor** button.

Printer Details: linux-server\Inkjet
Snippets
Click insert to insert a code snippet at the cursor position.
Common
Print job hook stub (starting point) insert
Check that job analysis is complete insert
Tests
Test number of pages insert
Test if job is color insert
Test if job is duplex insert
Test job cost insert
Test job time (hour) insert
Test job time (day) insert
User Interaction
Send a message to the user's client tool insert

Figure 16.6. Importing a print script snippet

16.1.3. Tips for Print Scripts

1. Use snippets and/or recipes where possible. They are tested and demonstrate best practice.
2. Start out small and aim high. Don't try building your script all in one go. Write a bit, test, then move on. Large scripts written in one go are hard to debug.
3. Always test your scripts! Just because a script compiles does not mean it is bug free. Take time to test your script and exercise all logic paths. For example, if your script applies an action to jobs with more than 100 pages, test it by printing jobs that are both more and less than 100 pages.
4. Check all your scripts from time to time for runtime errors and/or enable error level event notifications to receive an email when errors occur (see Section 12.6.2.3, “Error level event notifications”).
5. Take some time to explore the list of methods in the reference API documentation (see Section 16.2, “Print Script API Reference”). Knowing what is possible will open up ideas.
6. Use `actions.log.debug()` or `actions.client.sendMessage()` to assist with "print line" style debugging.
7. If your scripts interact with end-users, perform some usability testing to ensure they understand your messages and intentions.
8. Consider using HTML markup to pretty up your dialog messages (see the snippet titled **Show a dialog with HTML formatting**).

16.2. Print Script API Reference

Print scripts are segments of code that are run whenever a new print job arrives. The script is defined using the concept of a "hook". A hook is a JavaScript function that is defined by you, the script writer. It is also commonly referred to as an *entry point* or `method`. A number of print hooks (entry points) are available and each differ by the point in the print workflow when they are called. For example, a hook early in the workflow has the ability to influence behavior later in the flow, while scripts late will correspondingly have access to additional information that would not be available earlier. In most cases the generic main hook will satisfy most requirements.

> **Note**
>
> This API reference describing the all the properties and functions available to print scripts. Many of these inputs and functions reference JavaScript objects (e.g. String, Boolean, Date etc.). A good JavaScript reference will assist with making use of and formatting these objects. A good reference can be found at the Mozilla Developer Center here:
>
> https://developer.mozilla.org/en/JavaScript/Reference.

16.2.1. Script Hooks (Entry Points)

The available print hooks are:

Hook	Description
`printJobHook(inputs, actions)`	This is the main multi-purpose hook and will be suitable for most situations. *Point of Call:* Immediately before account selection popup displays. *Suitability:* Most situations as all print job inputs and most actions are available. *Limitations:* • Can't influence popup authentication behavior • End-user account selection information is not available
`printJobAfterAccountSelectionHook(inputs, actions)`	This hook should only be used to perform actions that use the result of the account selection popup (i.e. accesses `inputs.job.selectedSharedAccountName`). *Point of Call:* Immediately after account selection popup displays (or would display if enabled). *Suitability:* Only use when the result of the account selection is required. *Limitations:* • Can't influence account selection popup behavior or selected results (because it's already been completed) • Can't influence popup authentication behavior
`Other Hooks`	If you have the need for another hook (e.g. pre-authentication), please explain your requirements to the support team. Your input can influence the development of future scripting features.

Table 16.1. Print Workflow Hooks

All print job hooks have access to job, printer and user information and can perform a variety of actions that affect the job processing. The scripts have access to these through the two function arguments:

- `inputs` - *Read-only* access to the print job, user and printer information.
- `actions` - Access to perform actions that can influence the job processing, e.g. to cancel a job or send a message to the client software.

`inputs` are read-only and any modification to variables will not affect the print job. All actions (also known as side-effects) must be performed via the available `actions`. All available `inputs` and `actions` are listed below.

16.2.2. Script Inputs

16.2.2.1. Job Info (`inputs.job`)

Property/Method	Description
`inputs.job.date`	(date) The date/time the job was printed.

Property/Method	Description
`inputs.job.username`	(string) The username of the user that printed the job.
`inputs.job.printerServerName`	(string) The name of the server the print queue is hosted on.
`inputs.job.printerName`	(string) The printer name.
`inputs.job.fullPrinterName`	(string) The full name of the printer including the server name, in the format `server\printer`.
`inputs.job.documentName`	(string) The document name.

`inputs.job.isAnalysisComplete`	(boolean) Indicates that the print job has been completely analyzed. Before the job analysis is completed, only basic job information is available (e.g. date, username, printer, document name, client machine, etc). The detailed job information like page counts, paper size, costs, etc are only available after analysis is completed.
	
	If scripts require access to the detailed information, they should only access these once the job analysis is completed. This is achieved by placing the following snippet at the start of the print hook function:
	
	`if (!inputs.job.isAnalysisComplete) {`
	`  return;`
	`}`
	
	This snippet will exit the script if analysis is not complete. Once analysis is completed the script will be called again and continue past this point.

`inputs.job.isWebPrintJob`	(boolean) Determines if the job has been submitted by web print.
`inputs.job.clientMachine`	(string) The machine name of the client workstation where the job was printed. This may not be populated if the client machine name is not known.
`inputs.job.clientIP`	(string) The IP address of the client workstation where the job was printed. This may not be populated if the client IP address is not known.
`inputs.job.clientMachineOrIP`	(string) The machine name or IP address of the client workstation where the job was printed. If we know both the machine name and the IP address the machine name will be returned.
`inputs.job.selectedSharedAccountName`	(string) The full name of the selected shared account. If no shared account is selected the an empty string is returned (""). (Only available after the account selection is completed. i.e. from within the `printJobAfterAccountSelectionHook` hook.)
`inputs.job.totalPages`	(number) The total number of pages in the print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.totalSheets`	(number) The total number of sheets of paper produced by the job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.totalColorPages`	(number) The total number of color pages in the print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.totalGrayscalePages`	(number) The total number of grayscale pages in the print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.isGrayscale`	(boolean) Determines if the job is grayscale (i.e. contains no color). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.isColor`	(boolean) Determines if the job is color (i.e. contains at least one color page). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)

Property/Method	Description
`inputs.job.isDuplex`	(boolean) Determines job is duplex. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.cost`	(number) The cost of the job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.copies`	(number) The number of copies. The `totalPages` attribute already takes the copies into account. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.spoolSizeKB`	(number) The size of the spool size in kilobytes (KB). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.paperSizeName`	(string) The paper size name (e.g. Letter, Tabloid, A4, A3). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.paperSizeHeightMM`	(number) The height of the paper size in millimetres (mm). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.paperSizeWidthMM`	(number) The width of the paper size in millimetres (mm). (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.environmentBulbHours`	(number) The amount of energy used by this job in terms of the number of hours of use of a 60W light bulb. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.environmentTrees`	(number) The amount of paper used by this print job in terms of number of trees. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.environmentGramsCO2`	(number) The amount of carbon dioxide (C02) produced by this print job. (Only available when job analysis is complete. i.e. `isAnalysisComplete` is `true`.)
`inputs.job.calculateCostForPrinter(printerName)`	Calculates the cost of printing this job on another printer. This can be used to determine the "Least cost route" for this job. This returns the cost of the job. Parameters: • `printerName` (string) - The name of the printer to calculate the cost of the job for. This can be entered as `server\printer` or without the server name. If the server name is ommitted it is assumed the printer is on the same print server as the current job.

Table 16.2. Job Info Script Reference (`inputs.job`)

16.2.2.2. User Info (`inputs.user`)

Property/Method	Description
`inputs.user.username`	(string) The username of the user that printed the job.
`inputs.user.fullName`	(string) The full name of the user that printed the job (if known).
`inputs.user.email`	(string) The email address of the user that printed the job (if known).

Property/Method	Description
`inputs.user.office`	(string) The office of the user that printed the job (if known).
`inputs.user.department`	(string) The deparment of the user that printed the job (if known).
`inputs.user.restricted`	(boolean) Determines if the user is restricted. i.e. printing is denied when they have no credit.
`inputs.user.balance`	(number) The user's current account balance.
`inputs.user.isInGroup(groupName)`	Determines if the user belongs to the given group name (as defined on the **Groups** tab). Returns `true` if the user belongs to this group. Parameters: • `groupName` (string) - The name of the group to check

Table 16.3. User Info Script Reference (`inputs.user`)

16.2.2.3. Client Info (`inputs.client`)

Property/Method	Description
`inputs.client.isRunning`	(boolean) Determines if the user who printed the job is running the user client software. This can be used to adapt the script to handle when a client isn't running. e.g. Only display a popup question when the client is running.

Table 16.4. Client Info Script Reference (`inputs.client`)

16.2.2.4. Printer Info (`inputs.printer`)

Property/Method	Description
`inputs.printer.serverName`	(string) The name of the server where the printer is hosted.
`inputs.printer.printerName`	(string) The name of the printer.
`inputs.printer.fullPrinterName`	(string) The full name of the printer in format `server/printer`.
`inputs.printer.isVirtualQueue`	(boolean) Determines if this printer is a virtual queue.
`inputs.printer.isDisabled`	(boolean) Determines if this printer is currently disabled.
`inputs.printer.isStatusError`	(boolean) Determines if this printer is currently in an error state (e.g. paper jam, offline, etc.
`inputs.printer.statusInErrorSince`	(date) The time when the printer went into this error state.
`inputs.printer.statusInErrorSeconds`	(number) The number of seconds since the printer has been in error.
`inputs.printer.groups`	(Array) An array of all the printer groups that this printer is a member of.
`inputs.printer.isInGroup(groupName)`	(boolean) Determines if the printer belongs to a particular printer group. Returns `true` if the printer belongs to this group. Parameters: • `groupName` (string) - The name of the printer group to check.

Table 16.5. Printer Info Script Reference (`inputs.printer`)

16.2.2.5. Utilities (`inputs.utils`)

Method	Description
`inputs.utils.formatBalance(amount)`	Formats the balance amount based on the server currency settings. Returns a string. Parameters: • `amount` (number) - the amount to format.
`inputs.utils.formatCost(amount)`	Formats the cost amount (e.g. a job cost) based on the server currency settings. Returns a string. Parameters: • `amount` (number) - the amount to format.
`inputs.utils.formatNumber(amount, decimals)`	Formats a number with the given number of decimal places. Returns a string. Parameters: • `amount` (number) - the amount to format. • `decimals` (number) - The number of decimal places to format.

Table 16.6. Utilities Script Reference (`inputs.utils`)

16.2.3. Script Actions

16.2.3.1. Job Actions (`actions.job`)

Method	Description
`actions.job.addComment(comment)`	Appends a comment to the job. This will be logged to the database and is available in the job logs and reports. If the job already has a comment (e.g. set by the user with the advanced client) then this will append to the existing comment. Parameters: • `comment` (string) - The comment to add to the print job.
`actions.job.setCost(cost)`	Sets the cost of the print job. NOTE: If there are other cost adjustments configured (e.g. user cost overrides), these may further modify the job cost later in the job processing. Parameters: • `cost` (number) - The cost of the job. Must be greater than or equal to 0.
`actions.job.cancel()`	Cancels the current print job so that it will not be printed. The script should typically exit using `return` after cancelling the job.
`actions.job.chargeToPersonalAccount()`	Disables any client popups and account selection, and charges the job to the user's personal account.
`actions.job.chargeToSharedAccount(accountName)`	Disables any client popups and account selection, and charges the job to the specified shared account. Parameters: • `accountName` (string) - The name of the shared account. If the shared account is a sub-account then the account name must be provided in the format `parentName\subName`.
`actions.job.redirect(printerName[, options])`	Schedules the job to be redirected to the given printer queue. The job is redirected after it has completed processing (e.g. after print popups are acknowledged, filters are run, and the job is released from the hold/release queue). *NOTE: Jobs should only be redirected between compatibles printers (e.g. those that support the same printer language and features). For more information see Section 11.2, "Requirements For Job Redirection (Load Balancing or Find Me Printing)".*

Method	Description

	Parameters:
	• `printerName` (string) - The name of the printer to redirect to. This can be entered as `server\printer` or without the server name. If the server name is ommitted it is assumed the printer is on the same print server as the current job.
	• `options` (object/dictionary) - An optional parameter defining the additional options to the redirect command. Options include:
	  • `recalculateCost` (boolean) - Determines whether to recalculate the cost based on the settings of the destination printer. Default: `false`.
	
	Example 1: Redirect to a printer named "server\Fast Printer".
	`actions.job.redirect("server\\Fast Printer");`
	
	Example 2: Redirect to a printer named "server\Fast Printer", recalculating the cost based on the cost settings of the destination printer.
	`actions.job.redirect("server\\Fast Printer", {"recalculateCost": true});`

`actions.job.bypassReleaseQueue()`	Allows this job to pass through the queue without being held in a hold/release queue.
`actions.job.holdInReleaseQueue([mode])`	Holds this job in a hold/release queue that it was printed to. If the `mode` argument is ommitted the the job will be held in "User-release" mode. Parameters: • `mode` (string) - An optional parameter defining the release station mode. If set to `user-release`, the user can release the job. If set to `manager-release`, only an admin or print release manager can release the job. Default: `user-release`
`actions.job.bypassFilters()`	Allows this job to pass through the queue without being denied by the configured print filters/restrictions.
`actions.job.changeDocumentName(documentName)`	Changes the name of the document that will be logged in the database. Parameters: • `documentName` (string) - The new name of the document.
`actions.job.changeUser(username)`	Changes the user associated with the job (i.e. the user will be logged as the user that printed the job). Parameters: • `username` (string) - The username of the user.
`actions.job.changePersonalAccountChargePriority(accountNames)`	Allows overriding which of a users' personal accounts to charge and in which order/priority. This can be useful when a printer can only be used when credit is available in a particular subset of user personal accounts (e.g. department allocated quotas). Only those accounts listed will be charged for the job. If credit isn't available in the listed accounts the jobs is denied. *NOTE: This is only valid when Multiple Personal Accounts is enabled. See Chapter 26, Multiple Personal Accounts.* Parameters: • `accountNames` (array of strings) - the list of personal account names (as configured in **Options** → **Advanced**.) in the order they should be charged. e.g. `["Default", "Cash"]` Example: To allow the jobs to be only charge to the accounts "Science Department" and "Cash" (in that order) `actions.job.changePersonalAccountChargePriority( ["Science Department", "Cash"]);`
`actions.job.setWatermark(text)`	Sets the watermark text for this job. Watermarking allows text to be added on each printed page, e.g. the date and name of the user who printed the job.

Method	Description
	Parameters: • `text` (string) - the watermark text to add to each page of the job. The text may include replacement variables such as "%user%" (replaced with the username of the user who printed the job). An empty string will disable watermarking for this job. For more information about watermarking and the replacement variables that can be used in `text` see Section 7.13, "Watermarking/Job Annotation".

Table 16.7. Job Actions Script Reference (`actions.job`)

16.2.3.2. Client Actions (`actions.client`)

The client actions allow a script to send messages to the user client and prompt the user for a variety of questions. These require that the user is running the client software.

Method	Description
`actions.client.sendMessage(message)`	Sends a message to the user. This message is typically displayed as a task tray popup on Windows. Unlike the prompt actions, the user does not need to acknowledge the message to allow the job to print. Parameters: • `message` (string) - the message to display to the user.
`actions.client.promptOK(message[, options])`	Prompts the user with the message dialog that displays an **OK** button. Returns a string: • `"OK"` - if the user presses the OK button. • `"TIMEOUT"` - If the the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, "Client Prompt Message Formatting". • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, "Client Prompt Standard Options".
`actions.client.promptOKCancel(message[, options])`	Prompts the user with the message dialog that displays an **OK** and **Cancel** button. Returns a string: • `"OK"` - if the user presses the OK button. • `"CANCEL"` - if the user presses the OK button. • `"TIMEOUT"` - If the the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, "Client Prompt Message Formatting". • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, "Client Prompt Standard Options".
`actions.client.promptPrintCancel(message[, options])`	Prompts the user with the message dialog that displays a **Print** and **Cancel** button. Returns a string: • `"OK"` - if the user presses the OK button. • `"CANCEL"` - if the user presses the OK button. • `"TIMEOUT"` - If the the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, "Client Prompt Message Formatting".

Method	Description
	• `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, “Client Prompt Standard Options”.
`actions.client.promptYesNo(message[, options])`	Prompts the user with the message dialog that displays a **Yes** and **No** button. Returns a string: • `"YES"` - if the user presses the Yes button. • `"NO"` - if the user presses the No button. • `"TIMEOUT"` - If the the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, “Client Prompt Message Formatting”. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, “Client Prompt Standard Options”.
`actions.client.promptYesNoCancel(message[, options])`	Prompts the user with the message dialog that displays a **Yes**, **No** and **Cancel** button. Returns a string: • `"YES"` - if the user presses the Yes button. • `"NO"` - if the user presses the No button. • `"CANCEL"` - If the user presses the Cancel button. • `"TIMEOUT"` - If the the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, “Client Prompt Message Formatting”. • `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, “Client Prompt Standard Options”.

`actions.client.promptForText(message[, options])`	Prompts the user with the message dialog that prompts the user to enter text, and shows an **OK** and **Cancel** button. Returns a string:
	• `[user entered text]` - if the users enters text and presses OK.
	• `"CANCEL"` - If the user presses the Cancel button.
	• `"TIMEOUT"` - If the the user does not respond within the timeout period.
	
	Parameters:
	• `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, “Client Prompt Message Formatting”.
	• `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, “Client Prompt Standard Options”. Additional options include:
	  • `defaultText` (string) - The text that will pre-populate the text entry field.
	  • `fieldLabel` (string) - The label displayed on the left side of the text field. By default no field label is displayed, and the text-box fills the full width of the dialog.

`actions.client.promptForChoice(message, choices[, options])`	Prompts the user with the message dialog that prompts the user to select from one or more choices from a drop-down list, and shows an **OK** and **Cancel** button. Returns a string: • `[user selected choice]` - The selected choice item. • `"CANCEL"` - If the user presses the Cancel button. • `"TIMEOUT"` - If the the user does not respond within the timeout period. Parameters: • `message` (string) - the message to display to the user. For information on formatting messages see Section 16.2.3.2.2, “Client Prompt Message Formatting”. • `choices` (array of strings) - the list of choices to display in the drop-down

Method	Description

	list. e.g. `["Unclassified", "Restricted", "Top secret"]`
	• `options` (object/dictionary) - Options to change the behavior of the prompt. For the standard prompt options see Section 16.2.3.2.1, "Client Prompt Standard Options". Additional options include:
	  • `defaultChoice` (string) - The default choice which is pre-selected for the user. This must match one of the provided choices.
	  • `fieldLabel` (string) - The label displayed on the left side of the drop-down box. By default no field label is displayed, and the drop-down fills the full width of the dialog.

Table 16.8. Client Actions Script Reference (`actions.client`)

16.2.3.2.1. Client Prompt Standard Options

All the client prompt options have an `options` parameter to customize the prompt behavior. Some prompt types have additional options, but all prompt types have the following options:

- `dialogTitle` (string) - The title of the dialog.
- `dialogDesc` (string) - The brief one-line description to complement the dialog title.
- `hideJobDetails` (boolean) - Used to hide the job details from the user. e.g. document name, printer name, pages, cost, etc. Default: `false` - the job details are displayed.
- `timeoutSecs` (number) - The number of seconds to wait for a response from the user. Once this time elapses, the prompt method returns `"TIMEOUT"`. The default timeout is 5 minutes (300 seconds).
- `questionID` (string) - Uniquely identifies a question for a given print job and script. Once a user has responded to a prompt with a given `questionID`, the result will be remembered and the user will not be prompted again for this job. This is important as the print script may be called repeatedly if jobs are held awaiting prompts, popups or are held in a release queue. If the `questionID` is not provided, the question ID is automatically generated based on the prompt parameters (e.g. message, buttons, choices, etc).

  The `questionID` is rarely required, only in the following cases:

  - If the same prompt/question is required multiple times for a single script, and the user must answer each time. Assigning a different `questionID` to each prompt will ensure that the user is re-prompted.
  - If the message of a prompt changes with each call. e.g. if the message included the current time it would change each time the prompt was called. This would cause multiple prompts to appear. Assigning a `questionID` will avoid this re-prompting.
  - When performing validation of user-entered text from a text prompt in a `while` loop. A unique `questionID` should be assigned with each loop iteration, otherwise the user will not be reprompted and an infinite loop will occur (Print-Limit Pro will detect this and cancel the script execution).
- `fastResponse` (boolean) - When set to `true` Print-Limit will enable fast response mode to retrieve the response to the client prompt more quickly. This is only useful when displaying a sequence of prompts, and will cause the next prompt to display more quickly.

  IMPORTANT: This setting is only useful when displaying a sequence of prompts. Care should be taken when enabling this option as it may cause increased load on the server.

16.2.3.2.2. Client Prompt Message Formatting

The client prompts allow the administrator to display a message to the user and ask for user input. The dialog messages provide a subset of the most useful HTML formatting options. You can use them to make your message stand out and grab the user's attention.

Plain text formatting:

To use plain text formatting simply provide a standard JavaScript string as the `message` parameter. To start a new line, use the new line character `\n`. e.g.

```
actions.client.promptOK("First line\n\nSecond line");
```

HTML formatting:

The dialogs messages HTML formatting that provides a large subset of the most useful HTML formatting options. So you can get creative and make your message stand out and grab the user's attention.

To enable HTML formatting, surround the message text in `<html>` and `</html>` tags. Below is a very simple example that shows the word bold in bold.

```
actions.client.promptOK("<html>This is <b>bold</b></html>");
```

The client dialogs support many of the commonly used HTML features/elements including:

- Bold text - `<b>`
- Colored text - `<span style='color: red'>`
- Images - `<img src='http://host.com/image.jpg'>`
- Line breaks - `<br>`
- Font sizes - `<span style='font: 14px'>`
- Bullet lists - `<ul> / <li>`
- Numbered lists - `<ol> / <li>`
- Horizontal rule - `<hr>`

Tip

To reference an image stored in the directory `[app-path]/server/custom/web/my-image.jpg` use the HTML:

```
<img src='http://%PC_SERVER%/custom/my-image.jpg'>
```

The special substitution variable `%PC_SERVER%` is expanded to the name and port of your active Print-Limit server.

16.2.3.3. Log Actions (`actions.log`)

Method	Description
`actions.log.info(message)`	Logs an informational message to the **App. Log**. Parameters: • `message` (string) - the message to log.
`actions.log.warning(message)`	Logs an warning message to the **App. Log**. Parameters: • `message` (string) - the message to log.
`actions.log.error(message)`	Logs an error message to the **App. Log**. Parameters:

Method	Description
	• `message` (string) - the message to log.
`actions.log.debug(message)`	Logs a message to the server's text-based log file (`[app-path]/server/logs/server.log`). This can be helpful to diagnose problems with print scripts. Parameters: • `message` (string) - the message to log.

Table 16.9. Log Actions Script Reference (`actions.log`)

16.2.4. Print Script Requirements (Advanced)

These notes are intended for advanced developers "pushing the limits" of print script functionality. All print scripts must conform to the following technical requirements:

1. *Timeouts:* All scripts execution logic should complete within 5 seconds of CPU time. Failure to comply - say due to an infinite loop - will result in the script terminating and raising a runtime error. Five seconds should be adequate as even the most advanced example recipes complete within a few milliseconds.
2. *Reentrant and Idempotent:* All scripts should be reentrent - designed to be called multiple times for the same job, each time producing the same result/behavior. For example your script will be called multiple times at various stages of analysis and it's expected to provide the same output given the same input. Side-effects based off logic other than the `inputs` are not recommended. For example, logic based off the result of `Math.random()` would violate this principle.
3. *New APIs:* If you have a need for new APIs, please email the developers. We have a number planned such as the ability to influence account selection popup behavior, options to store/persist attributes on users and printers, exec external processes, and more layout options for dialogs. Please share your ideas!

Chapter 17. Licensing and Support

This section describes how to install the Print-Limit Pro license you receive after purchase, and also provides information about gaining support and assistance.

17.1. Installing a License

Print-Limit Pro licenses are issued as a digitally signed file. Installing the license file into the application enables the software for use within your organization.

To install the license file supplied by your vendor:

1. Save the license file to your hard disk. Your desktop is a handy location. Files are typically named `Print-Limit Pro-[orgname].license`.

Tip

There is no need to unzip the file. The file can be loaded into the system as supplied.

2. Log into the Print-Limit Pro administration interface.
3. Navigate to the **About** page.
4. Scroll down to the **Register** section and click the **Browse...** button.
5. Locate the license file saved in step 1 and click **Open**.
6. Click the **Install license** button.
7. Verify license information is correctly listed in the **About** page.

Note

The file supplied is simply a digitally signed and zipped text file containing your license information. It's converted to ZIP format to minimize size. If you're interested in viewing the contents of the file, rename the file to .zip and simply open it in any ZIP extraction utility.

If you have a question about your license or need assistance please email the Netop technical support team and they will be more than happy to assist you.

17.2. Technical Support & Further Information

The Netop technical support team is always happy to assist customers with further technical questions. Please feel free to contact us for assistance. Contact information is listed on our website at http://www.netop.com/printlimit_pro.

Chapter 18. Deployment on an External Database (RDBMS)

18.1. Overview

This section describes the process of running Print-Limit Pro on an external relational database, and describes why an organization would choose to do this. By default Print-Limit Pro uses an internal database product known as Apache Derby. This database engine was donated to Apache by IBM and was previously known as IBM Cloudscape.

18.1.1. Why use an external RDBMS?

The internal Print-Limit Pro database is stable, scalable, self-maintaining and provides very good performance. For this reason most organizations do not need to run Print-Limit Pro on an external database system. However there are some good reasons to run Print-Limit Pro on an external RDBMS, including:

- Your organization has existing database infrastructure and would like to consolidate all applications on the same database platform.
- Your organization has an existing database maintenance and backup procedure and would like Print-Limit Pro to take advantage of this.
- People would like to use 3rd party reporting and analysis tools (like Crystal Reports or Microsoft Access) to view and analyze the Print-Limit Pro database.
- Your organization is very large and requires the performance benefits of a dedicated RDBMS. This also allows the database to reside on a separate server to Print-Limit Pro, which improves the system scalability.

18.1.2. Supported Databases

Netop supports the following external databases out-of-the-box:

- Microsoft SQL Server 2000/2005/2008 (either 32 or 64 bit)
- Microsoft SQL Express 2005/2008 (free from Microsoft)
- PostgreSQL 7.1+ (a free open source database)
- MySQL 5.0+ (a free open source database)
- Oracle 9.2+ (including the free Oracle Express Edition).

These databases were chosen to cater for the majority of our customers.

18.2. Upsizing to an External RDBMS

Upsizing to an external RDBMS is a simple process that should take approximately 15-30 minutes. The high-level steps to upsize are:

1. Backup the existing data.
2. Create and initialize the new database.
3. Load the backed-up data into the new database.
4. Restart the application.

These steps are discussed in detail below.

This chapter also includes some sections that describe database specific configuration. See Section 18.3, “Database specific configuration” for more details.

Important

Each application server requires exclusive access to an external database. i.e. A single database cannot be shared between more than one application server. If you are running multiple application servers (e.g. a test and production instance), then each must have a separate database.

18.2.1. Step 1 - Stop Print-Limit Pro

To upsize to an external database the application server must be stopped. This allows the data to be backed up, guaranteeing that all data is saved and ready to load into the new database.

The instructions to stop the application server can be found in Section A.6, “Stopping and Starting the Application Server”.

18.2.2. Step 2 - Perform a backup of the existing data

Perform a backup of the database. This data will be loaded into the application in a following step. A detailed discussion about backups can be found in Section 12.5, “System Backups”. To backup the database:

1. On the server, open a command prompt.
2. If running on Linux or Mac, use `su` or equivalent to become the identity of printlimit. e.g.

```
Mac:     sudo su - printlimit
Linux:   su - printlimit
```

3. Change (`cd`) to the server binaries directory. e.g.

```
Windows:  cd "C:\Program Files\Print-Limit Pro\server\bin\win"
Mac:      cd "/Applications/Print-Limit Pro/server/bin/mac"
Linux:    cd ~printlimit/server/bin/linux-*
```

4. Run the following command: `db-tools export-db`
5. The output of the above command shows the name of the backup file created. Take note of this because it will be required in a future step.

18.2.3. Step 3 - Create a new database in the external RDBMS

This step depends on the external database you are using, and it is assumed that the administrator knows how to create a new database. No matter what database is used the following steps must be performed:

1. Create a new empty database for dedicated use by Print-Limit Pro. When creating the database make sure to select the correct character encoding for your language. For SQL Server, the character encoding is set in the **Collation** field on the new database screen. For other databases like PostgreSQL or MySQL it is recommended to select a unicode character set (like UNICODE or UTF8) that allows all possible characters to be stored.
2. Create a new database user (and password) for the Print-Limit Pro to use to connect to the database.
3. Assign the appropriate permissions to the new user to give them full access to the new database (e.g. permission to create/drop tables, and select/insert/update/delete in all tables).

Important

To use SQL Server you must ensure that SQL Server has the TCP protocol, and the server

authentication option is set to "SQL Server and Windows Authentication".

Important

The database user created for Print-Limit Pro should only have minimal set of permissions required for the Print-Limit application. The user should have full permissions to create/drop tables and have full access to any created tables. However, the user should not have permissions to access other databases installed on the database server.

18.2.4. Step 4 - Change the Print-Limit Pro connection details

The next step is to configure Print-Limit Pro to connect to the new external database. To do this:

1. On the server, open the server config file:

   ```
   [app-path]/server/server.properties
   ```

   in a text editor (e.g. Notepad).
2. Comment out the line:

   ```
   database.type=Internal
   ```

   by adding a # (hash) character to the beginning of the line.
3. Find the database connection details for the database type you require (e.g. SQL Server or PostgreSQL), and uncomment the lines by removing the # (hash) characters.
4. Set the username and password used to connect to the database

   ```
   database.username=[your-db-user]
   database.password=[your-db-password]
   ```

5. Set the database URL, which describes the location and connection details of the external database. See below for details of the format of the database URLs for different database types.

Important

If using Microsoft SQL Server, the username specified in the configuration settings is a SQL Server database user, not a Windows user. This user needs to be created in the SQL Server and granted full rights to the application database.

18.2.4.1. SQL Server Database Connection URL Format

The SQL Server URL format is:

```
jdbc:jtds:sqlserver://[server]/[database]
```

The `[server]` parameter is the name of the server running the SQL Server database, and must be resolvable from

the Print-Limit Pro server. If the SQL Server instance is running on the same machine then `localhost` can be used.

The `[database]` parameter is the name of the SQL Server database you created in Step 3 above.

When using SQL Server instances, the instance name is specified in the connection URL as follows:

```
jdbc:jtds:sqlserver://[server]/[database];instance=[instancename]
```

18.2.4.2. SQL Server Express Database Connection URL Format

The SQL Server Express format is:

```
jdbc:jtds:sqlserver://[server]:[port]/[database]
```

The `[server]` parameter is the name of the server running the SQL Server database, and must be resolvable from the Print-Limit Pro server. If the SQL Server instance is running on the same machine then `localhost` can be used.

The `[port]` parameter is the port the SQL Server Express edition is configured to listen on. For more information on configuring SQL Express, please see Section 18.3.1, “Configuring Microsoft SQL Express”.

The `[database]` parameter is the name of the SQL Server database you created in Step 3 above.

18.2.4.3. PostgreSQL Database Connection URL Format

The Postgres URL format is:

```
jdbc:postgresql://[server]/[database]
```

The `[server]` parameter is the name of the server running the PostgreSQL database, and must be resolvable from the Print-Limit Pro server. If the PostgreSQL instance is running on the same machine then `localhost` can be used.

The `[database]` parameter is the name of the PostgreSQL database you created in Step 3 above.

18.2.4.4. MySQL Database Connection URL Format

The MySQL URL format is:

```
jdbc:mysql://[server]/[database]
```

The `[server]` parameter is the name of the server running the MySQL database, and must be resolvable from the Print-Limit Pro server. If the MySQL instance is running on the same machine then `localhost` can be used.

The `[database]` parameter is the name of the MySQL database you created in Step 3 above.

Important

See Section 18.3.2, “Configuring MySQL” for specific instructions to configure MySQL.

18.2.4.5. Oracle Database Connection URL Format

The Oracle URL format is:

```
jdbc:oracle:thin:@[server]:[port]:[SID]
```

The `[server]` parameter is the name of the server running the Oracle database, and must be resolvable from the Print-Limit Pro server. If the Oracle instance is running on the same machine then `localhost` can be used.

The `[port]` specifies the port number that the Oracle services are listening on. By default this is 1521.

The `[SID]` specifies the Oracle service identifier used to identify the database. The SID for Oracle Express edition is XE.

Important

See Section 18.3.3, “Configuring Oracle (and Oracle Express Edition)” for specific instructions to configure Oracle.

18.2.5. Step 5 - Initialize the new database

The next step is to initialize the new database, creating the required database tables and initial data. To initialize the database:

1. On the server, open a command prompt.
2. If running on Linux or Mac, use `su` or equivalent to become the identity of printlimit. e.g.

```
Mac:     sudo su - printlimit
Linux:   su - printlimit
```

3. Change (`cd`) to the server binaries directory. e.g.

```
Windows:       cd "C:\Program Files\Print-Limit Pro\server\bin\win"
Mac:           cd "/Applications/Print-Limit Pro/server/bin/mac"
Linux (32bit): cd ~printlimit/server/bin/linux-i686
Linux (64bit): cd ~printlimit/server/bin/linux-x64
```

4. Run the following command: `db-tools init-db`

A message will be displayed to indicate that the connection details are correct the database was initialized correctly.

18.2.6. Step 6 - Load the data into the new database

This step loads the data (that was exported in Step 2) into the database. To import the data:

1. On the server, open a command prompt.
2. If running on Linux or Mac, use `su` or equivalent to become the identity of printlimit. e.g.

```
Mac:     sudo su - printlimit
Linux:   su - printlimit
```

3. Change (cd) to the server binaries directory. e.g.

```
Windows:       cd "C:\Program Files\Print-Limit Pro\server\bin\win"
Mac:           cd "/Applications/Print-Limit Pro/server/bin/mac"
Linux (32bit): cd ~printlimit/server/bin/linux-i686
Linux (64bit): cd ~printlimit/server/bin/linux-x64
```

4. Run the following command: `db-tools import-db "backup file name"`
5. This command will show progress importing the data.

If no errors occurred then the application is ready to restart.

18.2.7. Step 7 - Restart Print-Limit Pro

The data has now been moved to the new database and the server can be restarted.

The instructions on how to start the server can be found in Section A.6, “Stopping and Starting the Application Server”.

Wait 30 seconds for the server to start, then log in to the admin console. If you can log in successfully, then the upsizing process worked successfully.

18.3. Database specific configuration

This section includes database specific configuration for use with Print-Limit Pro.

18.3.1. Configuring Microsoft SQL Express

Microsoft SQL Express provides enterprise class database performance for free. However it does have some limitations when compared to the full version of SQL Server. But these limitations are not likely to adversely affect most Print-Limit Pro users. These limitations include:

- 4GB limit on database sizes
- Limited to only use 1 CPU
- Limited to only use 1GB of RAM

This section described how to configure Microsoft SQL Express edition for use with Print-Limit Pro. It is assumed that SQL Server Express is already installed with the default configuration.

Once this configuration is complete, the database can be used with Print-Limit Pro by following the instructions in Section 18.2, “Upsizing to an External RDBMS”.

18.3.1.1. Enable TCP/IP connections

Print-Limit Pro uses TCP/IP to connect to the SQL Server database, but SQL Server Express does not enable TCP support by default. To enable TCP/IP:

1. On the machine with SQL Express installed, open the **SQL Server Configuration Manager**.
2. Expand the **SQL Server Network Configuration** node on the left.
3. Select the **Protocols for SQLEXPRESS** node on the left.
4. Right-click the TCP/IP item on the right and select **Properties**.
5. On the **General** tab, change **Enabled** to Yes.
6. On the **IP Addresses** tab, under the **IPAll** node clear the **TCP Dynamic Ports** field. Also enter the port to listen on in the **TCP Port** field. For example, 1450. Remember this port, because it needs to be used in the Print-Limit Pro connection string.

7. On the **OK** button to save the changes.
8. Restart the Microsoft SQL Server Express service using either the standard service control panel or the SQL Express tools.

18.3.1.2. Enable SQL Server authentication

Print-Limit Pro requires SQL Server authentication to be enabled on the instance of SQL Express. To do this:

1. On the machine with SQL Express installed, open the **SQL Server Management Studio Express** tool.
2. Right-click the instance of SQL Express to configure, and select **Properties**.
3. Select the **Security** section on the left.
4. Change the **Server Authentication** to **SQL Server and Windows Authentication mode**.
5. Restart the Microsoft SQL Server Express service using either the standard service control panel or the SQL Express tools.

18.3.1.3. Create Database User

Print-Limit Pro requires a user to connect to the database. To create this user:

1. On the machine with SQL Express installed, open the **SQL Server Management Studio Express** tool.
2. Right-click the **Security->Logins** node, and select **New Login ...**.
3. Enter the username (e.g. printlimit).
4. Change the **Server Authentication** to **SQL Server and Windows Authentication mode**.
5. Enter the user's password.
6. Disable password expiration.
7. On the **OK** button to create the user.
8. After creating the Print-Limit Pro database assign this user `db_owner` permissions on the database, so that it can create the required database tables.
9. To initialize the database, follow the instruction in Section 18.2, “Upsizing to an External RDBMS”.

18.3.2. Configuring MySQL

MySQL is a free/open-source database solution that provides robust, proven and scalable storage at a great price. Print-Limit Pro supports MySQL 5.0 and higher.

Important

Print-Limit Pro requires the use of the MySQL InnoDB table type, which provides full support for transactions. Please ensure your MySQL database server is configured to support InnoDB (usually this is enabled by default).

18.3.2.1. Database Driver

Print-Limit Pro does not ship with a database driver for MySQL because the MySQL licensing does not allow redistribution of the driver. These drivers can be downloaded for free from the MySQL website as described below.

To download the required version of the driver:

1. Visit the MySQL web site download page for the *MySQL Connector/J* product here: http://dev.mysql.com/downloads/connector/j/.
2. Select the appropriate driver version (the latest version is best).

3. Download the driver package and unzip the contents to a temporary directory.
4. Find the driver JAR file, which is typically named `mysql-connector-java-X.Y.Z-bin.jar`.
5. Copy the JAR file into the `[app-path]\server\lib-ext` directory. This will allow Print-Limit Pro to find and load the driver.

Once the driver is installed into Print-Limit Pro the standard upsizing procedure can be followed. See Section 18.2, “Upsizing to an External RDBMS”.

18.3.3. Configuring Oracle (and Oracle Express Edition)

Oracle is a high-end database solution that provides a very robust and scalable data storage solution. And with the release of Oracle Express Edition, it is available at no cost, but it does have some limitations that should not impact Print-Limit Pro installations.

Print-Limit Pro supports Oracle versions 9.2 and higher. Oracle 8 (and earlier) are not supported because they did not support the `TIMESTAMP` datatype required by Print-Limit Pro.

18.3.3.1. Database Driver

Print-Limit Pro does not ship with a driver for Oracle because Oracle does not allow us to redistribute the driver and the recommended driver depends on the version of Oracle used. These drivers can be obtained from the Oracle website as described below.

To download the required version of the driver:

1. Visit the Oracle web site here: http://www.oracle.com/technology/software/tech/java/sqlj_jdbc/index.html
2. Select the appropriate Oracle version.
3. Download the driver file for JDK 1.4 or later. The filename is usually called: `ojdbc14.jar`
4. Copy the downloaded file into the `[app-path]\server\lib-ext` directory. This will allow Print-Limit Pro to find and load the driver.

Once the driver is installed into Print-Limit Pro the standard upsizing procedure can be followed. See Section 18.2, “Upsizing to an External RDBMS”.

Chapter 19. Web Print (Driver-less printing via a web browser)

Web Print is a driver-less printing service that allows users to print by uploading documents from a web browser. No client software or driver installation is required. Web Print provides a simple way to enable printing for laptop, wireless and anonymous users without the overhead of installing printer drivers and managing server authentication.

The recent growth in popularity of laptops and other small devices such as NetBooks and smart phones is changing the landscape of network printing. Where it was previously normal to only allow printing from in-house systems there is now a growing need to support casual printing from user-owned devices. Providing users with information about how to configure these devices can be inconvenient and complicated due to issues such as drivers and authentication, and in some situations may not be possible at all.

Due to this complexity many organizations opt to simply disallow printing from user-owned systems. A common workaround in these environments is for users to send themselves a document (e.g. via email, on a USB drive) and print from an in-house system. Web Print works in a similar way: it allows a user to upload their file to an in-house system (known as a Web Print server) and have this system perform the printing on their behalf.

With Web Print users are authenticated when they log into the Print-Limit Pro end-user web interface. Any documents they upload can then be tracked against their user name. Users have access to the standard selection of features normally available for in-house printing, including access to shared accounts.

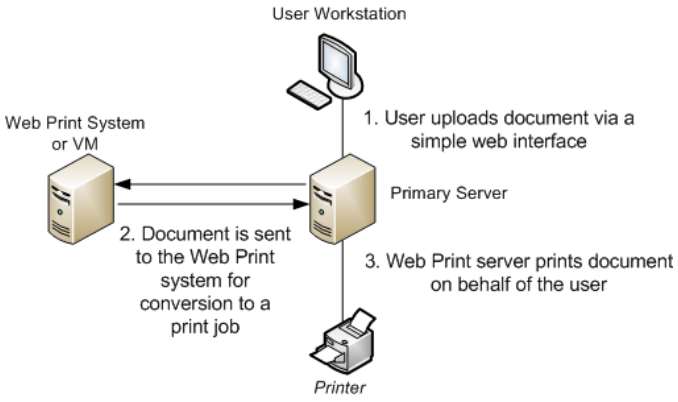

User Workstation
Web Print System or VM
1. User uploads document via a simple web interface
Primary Server
2. Document is sent to the Web Print system for conversion to a print job
3. Web Print server prints document on behalf of the user
Printer

Figure 19.1. Web Print architecture overview

19.1. Key Features

Some of the key features of Print-Limit's Web Print solution include:

- Simple wizard style interface, accessed from any web browser.
- Users authenticate with their regular (network / domain) logins.
- 100% web based. No drivers, client software, or browser plugins required.
- File uploads with progress indicator (in the style of GMail attachment uploads).
- Supports popular document formats including PDF, DOC/DOCX (and other Microsoft Office Word formats), XLS/XLSX (and other Microsoft Office Excel Formats), PPT/PPTX (and other Microsoft Office PowerPoint formats), and Microsoft XPS (XML Paper Specification).
- Users select printers from an auto-generated list or a clickable printer map, which can be designed or imported using open standards and free software.

19.2. Introduction to Web Print

Web Print works by accepting popular file formats and converting them to print jobs using common applications. This is done by orchestrating and controlling applications such as Adobe Reader ™, Microsoft Office ™ and the Microsoft XPS Viewer as background server-side tasks. Using this approach ensures that maximum print compatibility and quality is maintained.

Important

Adobe Reader, Microsoft Office and XPS Viewer are not supplied with Print-Limit. It is your responsibility to purchase and conform to the licensing requirements of any third party software.

19.2.1. Supported Applications and File Formats

The following table lists the applications that Web Print may use to render uploaded documents into print jobs. Before a file format can be accepted as an upload its supporting application must be installed.

Note that when running Web Print on Windows in simple mode Microsoft Office applications are not available due to limitations in the applications. See Section 19.3, “Setting Up Web Print” for information about the difference between *simple* and *sandbox* modes.

Application	File Format(s)
Adobe Reader 9, Adobe Reader X (10)	PDF
Microsoft Office Excel 2007, 2010	XLS, XLSX, etc.
Microsoft Office PowerPoint 2007, 2010	PPT, PPTX, etc.
Microsoft Office Word 2007, 2010	DOC, DOCX, etc.
Microsoft XPS Standalone Viewer (Essentials Pack) - For more information please see Section 19.7, “XPS Viewer Installation Instructions”	XPS

Table 19.1. Web Print Supported Applications and File Formats

19.2.2. Security Considerations

Before setting up Web Print it is worth considering any security implications. Because Web Print allows any user with access to the Print-Limit Pro user web interface the ability to upload a document for printing, it naturally increases surface area for attack.

More specifically, security vulnerabilities that might usually be considered local because they are triggered by opening a document in a Microsoft Office application or Adobe Reader can become a remote vulnerability. This is because these same applications are used to render print jobs on the server after the user has uploaded their document.

Much of the security risk can be mitigated through security best practice, such as regularly applying security updates to the orchestrated applications. Organizations that are very security conscious may with to consider the sandbox approach. Sandboxing the Web Print server provides an extra layer of protection/isolation.

19.3. Setting Up Web Print

Web Print may be configured in one of two possible modes: *simple mode* or *sandbox mode*.

Simple mode involves running the Web Print software on the same system as the Print-Limit Pro primary server. It is the fastest and easiest way to get Web Print working.

Setting up Web Print in sandbox mode involves a sandboxed or virtualized system, isolated and dedicated to the task of processing Web Print jobs. Sandbox Mode takes a little more time to configure but offers several advantages, including improved security and more supported formats.

Primary Server Type	Simple Mode	Sandbox Mode
Microsoft Windows	Yes (PDF only)	Yes. All formats supported
Apple Mac	Yes (PDF only)	Yes. All formats supported
Linux running CUPS	Yes (PDF only)	Yes. All formats supported
Novell OES Linux	No. Simple Mode not supported	Yes. All formats supported

Table 19.2. Web Print Setup Options (by platform)

19.3.1. Simple Mode Setup

Simple mode involves running the Web Print software on the same system as the Print-Limit Pro primary server. It is the fastest and easiest way to get Web Print working. It is suitable for testing Web Print functionality or where only PDF support is required.

In simple mode the Web Print software runs as a service (background process or daemon) that is responsible for watching a directory for documents (e.g. PDFs) submitted by users. When a new document is detected the background process opens the document and prints it. The service runs as a user that has rights to open the application and access print queues.

19.3.1.1. Web Print Simple Mode Setup for Windows Servers (PDF Only)

This section describes how to configure Web Print on the same Windows system as the Print-Limit primary server. This is the fastest and easiest way to get Web Print up and running on a Windows system. Due to the inability of Microsoft Office or XPS Viewer applications to run as a system service, these file formats are only available on Windows when Web Print is configured in sandbox mode. See Section 19.3.2, “Sandbox Mode Setup” for more information.

1. Install the latest version of Adobe Reader [http://get.adobe.com/reader/] on the system running Print-Limit Pro.
2. The Print-Limit Pro Web Print server needs to run under a user account so that it has permission to access printers and use the locally installed Adobe Reader.
   a. Create a new user account called `webprint` (or equivalent). If it is not possible to create a domain user or the system is not a member of a domain then create a local user account instead. *The password for this account should be set to never expire.* At a minimum this account needs access to the printers and the ability to run local programs.
   b. Test Adobe Reader as the `webprint` user: Log into the Print-Limit primary server as the newly created account. Open a number of different PDF files in Adobe Reader and print to several different printers, ensuring that all works as expected. *IMPORTANT* Make sure you *permanently* acknowledge any license agreement and customer experience program dialogs during this process.

Important

If using Acrobat Reader X, you must disable the Reader's Protected Mode feature, see Section 19.3.1.1.1, “Disabling Adobe Reader X protected mode”.

   c. Test that the user has write access to `[app-path]/server/data/web-print-hot-folder/`, e.g. by creating a new empty text file in that folder.
   d. Log in as an administrator level user again.

      Open the Windows Services dialog (**Start** → **Control Panel** → **Administrative Tools** → **Services**).
   e. Right-click the service named **Print-Limit Web Print Server** and select Properties.
   f. From the **Log On** tab select **This account:** and enter the credentials for the newly created `webprint` service account.
   g. From the **General** tab change the **Startup type** to **Automatic**.

h. Press **Apply**.

i. Press **Start** to start the service.

3. Log into the Print-Limit Pro admin interface and navigate to **Options** → **General** → **User Features**.

4. In the section titled **Web Print Server** ensure that the **Status** is **OK**. If the status indicates an error see Section 19.6, “Troubleshooting Web Print Problems” for assistance.

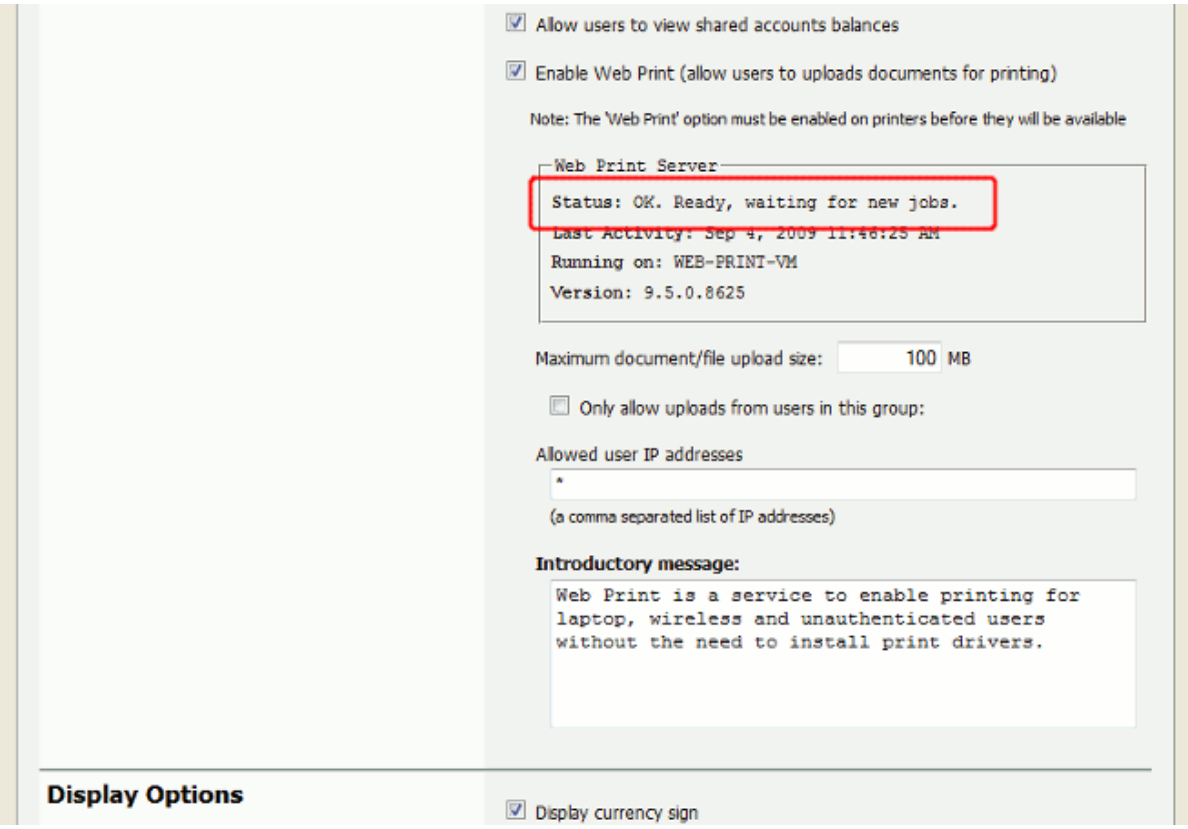

Allow users to view shared accounts balances
Enable Web Print (allow users to uploads documents for printing)
Note: The 'Web Print' option must be enabled on printers before they will be available
Web Print Server
Status: OK. Ready, waiting for new jobs.
Last Activity: Sep 4, 2009 11:46:25 AM
Running on: WEB-PRINT-VM
Version: 9.5.0.8625
Maximum document/file upload size: 100 MB
Only allow uploads from users in this group:
Allowed user IP addresses
*
(a comma separated list of IP addresses)
Introductory message:
Web Print is a service to enable printing for laptop, wireless and unauthenticated users without the need to install print drivers.
Display Options
Display currency sign

Figure 19.2. Web Print Server status OK

5. The Web Print setup is now complete and ready for testing. Continue at Section 19.4, “Web Print Testing and Feature Tour” to test printing and functionality.

19.3.1.1.1. Disabling Adobe Reader X protected mode

When using Adobe Reader X (version 10) you will need to ensure that Adobe Reader X's Protected Mode is disabled. This feature prevents Print-Limit from printing PDF documents.

Disabling Adobe Reader X's Protected Mode is done by navigating to **Edit** → **Preferences** → **General Category** and then unchecking **Enable Protected Mode at startup** as shown below.

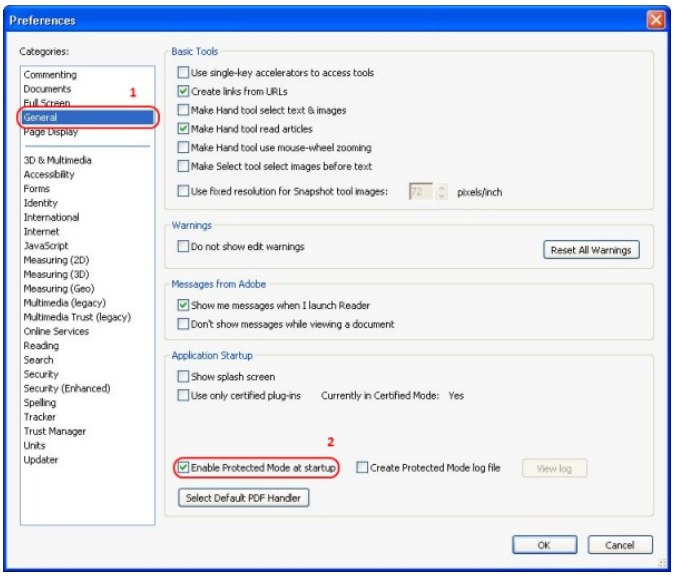


Figure 19.3. Modifying Adobe Reader X's Protected Mode

19.3.1.2. Web Print Simple Mode Setup for Mac and Linux Servers (PDF Only)

Web Print *Simple Mode* supporting PDF documents is enabled and configured by default on Mac and Linux systems (running CUPS). No additional configuration should be required. To confirm that everything is configured correctly, check the **Web Print Status** section under **Options** → **General** → **User Features**. The status should be listed as OK. The Web Print option will also need to be enabled on at least one printer. If there are any status issues, or if basic Web Print testing produces some errors, please consider these limitations/requirements:

- The printers targeted for use in via Web Print must be configured as print queues on the Primary Print-Limit Server.
- The printers (as setup on the server) must have working compatible drivers.
- Linux: The Primary Server must be running CUPS version 1.2 or higher.
- Administrators may find the following log file useful in diagnosing issues: `[app-path]/providers/web-print/[platform]/logs/web-print.log`

Simple mode for Novell OES Linux and iPrint is not available. Novell OES users should implement the Sandbox Mode (following section).

19.3.2. Sandbox Mode Setup

Sandbox mode is different to simple mode in that the Web Print software runs as a standard GUI application on a dedicated Windows system (often a virtual machine). The dedicated system is configured to be always logged on and running the Web Print software. This software watches a mapped network share hosted on the Print-Limit primary server for the arrival of new documents submitted by users. These documents are then opened in the appropriate application and printed.

Sandbox mode takes a little more time to configure but offers several advantages, such as support for Microsoft Office formats and improved security. Improved security is gained by opening and printing documents on an isolated system, separate from the Print-Limit primary server, with the only connection between the two being via a simple file share / mapped drive.

Prerequisites:

- A dedicated, standalone, cleanly installed system or virtual machine.

- Windows operating system (suggested: 7, Vista or XP).
- Adobe Reader 9, Adobe Reader X (10)
- Microsoft Office 2007, 2010 (to support Office formats)
- Microsoft Standalone XPS Viewer / XPS Essentials Pack (to support Microsoft XPS) - download here [http://www.microsoft.com/downloads/details.aspx?FamilyID=b8dcffdd-e3a5-44cc-8021-7649fd37ffee]

To set up Web Print in Sandbox Mode:

Important

First before setting up Web Print in *Sandbox Mode* ensure Web Print in *Simple Mode* is disabled as follows:

- On Windows, stop and disable the `Print-Limit Web Print Server` System Service (set its **Startup type** to **Disabled**).
- On Mac and Linux, use a text editor to edit the file `[app-path]/providers/web-print/[platform]/web-print.conf` and change setting `enabled` to `enabled=off`.

  Remove the Web Print status files (named `web-print-server.activity` and `web-print-server.status`) located in the hot-folder `/Applications/Print-Limit Pro/server/data/web-print-hot-folder`.

  Restart the server (or services) to ensure the change is applied.

1. Make sure Simple Mode is disabled (see *Important* box above).
2. Set up a new virtual machine (e.g. using VMware Server [http://www.vmware.com/], Microsoft Virtual Server [http://www.microsoft.com/windowsserversystem/virtualserver/] or VirtualBox [http://www.virtualbox.org/]) or a standalone system (e.g. a dedicated desktop PC). This system will house the Web Print server software and any required printing applications, and will be termed the *Web Print server*.

   This system does not need access to all network resources, but will need access to printer shares and the hot folder share (created later in step 7).

   ## Important

   Ensure that the system clocks on the primary server and the web print sandbox are synchronized to a common clock. Time differences between these systems may cause problems with the web print system.

3. Create a new user account called `webprint` (or equivalent). *The password for this account should be set to never expire.* At a minimum this account needs access to the printers, the ability to run local programs and the ability to access the hot folder share (created in step 7).
4. Log in as the `webprint` user. Add print queues for the printers that should be made available to users via Web Print. The print queues should be added in the same way that they would be added to a workstation. They should point to the print queues hosted on the print server, i.e. a Network Printer mapped to `\\server\printer-share`. *It is important that the jobs pass via the queue on the server - do not add a Local Printer.* You should also use add the printers using the print server's machine name and not an IP address.
5. Install one or more of the applications listed in Table 19.1, “Web Print Supported Applications and File Formats”. The applications installed will determine which file formats are available to users for upload and printing.

   As the `webprint` user, open a file in each of the installed applications and print to several different printers,

ensuring that all works as expected. *IMPORTANT* Make sure you *permanently* acknowledge any license agreement screen, initial-run wizard, or customer experience program dialog during this process.

Tip

When installing Microsoft Office applications choose all optional components for installation. This will prevent printing issues occurring due to missing components.

Important

If using Acrobat Reader X, you must disable the Reader's Protected Mode feature, see Section 19.3.1.1.1, “Disabling Adobe Reader X protected mode”.

6. Configure the Web Print server to automatically log in as the `webprint` user on startup. This system will permanently stay running and logged in as this user.
   - Automatic logon for Windows Vista [http://windowshelp.microsoft.com/Windows/en-US/help/e224c60c-0708-48ba-ae97-fcdaddb3dd9d1033.mspx]
   - Automatic logon for Windows XP [http://support.microsoft.com/kb/315231]
7. The primary server and the software on the sandboxed Web Print server communicate via a standard network file share. On the Print-Limit primary server, share the folder at `[app-path]\server\data\web-print-hot-folder\` and name the share `PCWebPrint`. The hot folder facilitates communication between the primary server and the Web Print server.

   Adjust both the **Sharing** and **Security** (NTFS/file) permissions of the `PCWebPrint` share to allow the `webprint` user read *and write* access.

Tip

By default Web Print will use this folder, not a sub-folder. You do not need to create a sub-folder in this folder.

8. Log in to the Web Print server as the `webprint` user. Map the `W:` drive to the `PCWebPrint` share. Ensure that the option **Reconnect at logon** is selected when mapping the drive.
9. Test that the file share can be accessed and written to from the Web Print server (e.g. by creating a new text file on `W:`). It is also recommend to test in the other direction as well and confirm that files created on the primary server in the folder `web-print-hot-folder` be opened/seen from the Web Print server.
10. Run the main Print-Limit Pro installer on the Web Print server and select the **Web Print server installation (sandbox mode)** install option.
11. Configure the `webprint` user to run `[app-path]\providers\web-print\win\pc-web-print.exe` at login (e.g. by adding a shortcut to the user's `Startup` folder).
12. Reboot the system. Ensure that the system automatically logs in as the `webprint` user when it starts up, and that the **Print-Limit Web Print** dialog is displayed shortly afterwards.

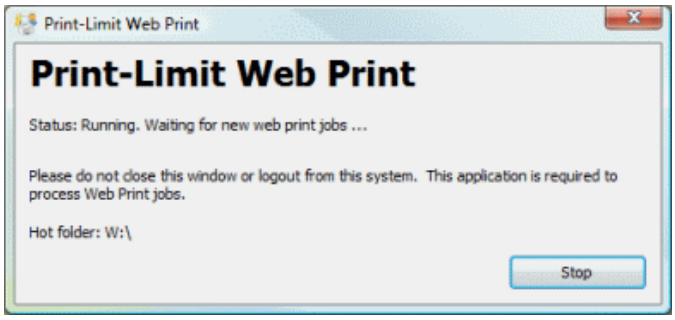

Print-Limit Web Print
Print-Limit Web Print
Status: Running. Waiting for new web print jobs ...
Please do not close this window or logout from this system. This application is required to process Web Print jobs.
Hot folder: W:\
Stop

Figure 19.4. The Print-Limit Web Print dialog

See Section 19.6, “Troubleshooting Web Print Problems” for assistance if the dialog indicates an error.

13. Log into the Print-Limit Pro admin interface and navigate to **Options** → **General** → **User Features**.
14. In the section titled **Web Print Server** ensure that the **Status** is **OK**. If the status indicates an error see Section 19.6, “Troubleshooting Web Print Problems” for assistance.

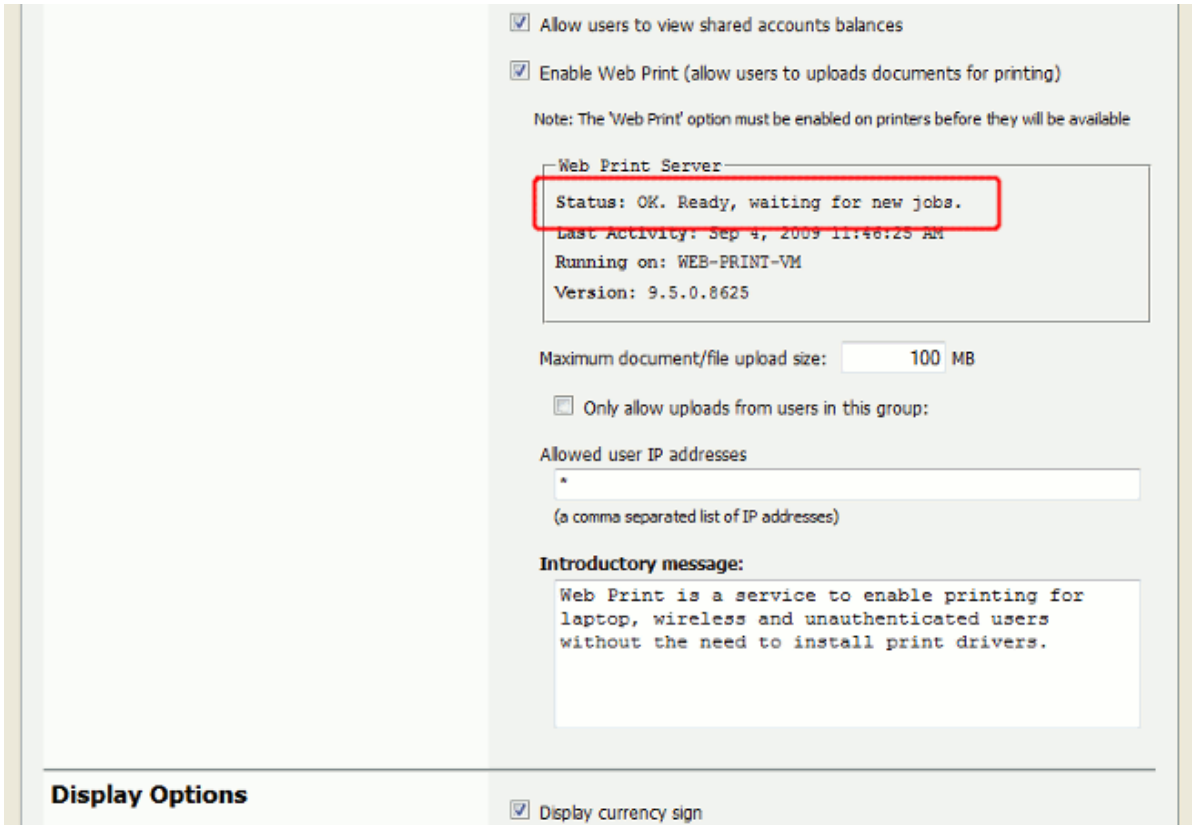

Allow users to view shared accounts balances
Enable Web Print (allow users to uploads documents for printing)
Note: The 'Web Print' option must be enabled on printers before they will be available
Web Print Server
Status: OK. Ready, waiting for new jobs.
Last Activity: Sep 4, 2009 11:46:25 AM
Running on: WEB-PRINT-VM
Version: 9.5.0.8625
Maximum document/file upload size: 100 MB
Only allow uploads from users in this group:
Allowed user IP addresses
*
(a comma separated list of IP addresses)
Introductory message:
Web Print is a service to enable printing for laptop, wireless and unauthenticated users without the need to install print drivers.
Display Options
Display currency sign

Figure 19.5. Web Print Server status OK

15. The Web Print setup is now complete and ready for testing. Continue at Section 19.4, “Web Print Testing and Feature Tour” to submit a test print job and test functionality.

19.4. Web Print Testing and Feature Tour

This section covers the usage and main features of Web Print. For detailed configuration see Section 19.5, “Web Print Configuration”.

1. Log into the Print-Limit Pro user interface and click the **Web Print** link in the navigation menu.

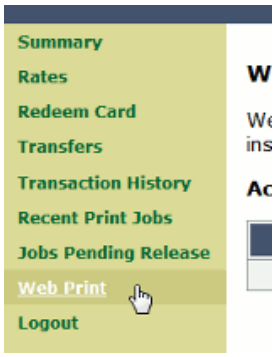


Figure 19.6. Web Print link in the user interface

2. The front page contains a list of active and recently submitted Web Print jobs for the logged in user. At first the list will be blank. Later the list will show the status of submitted jobs.

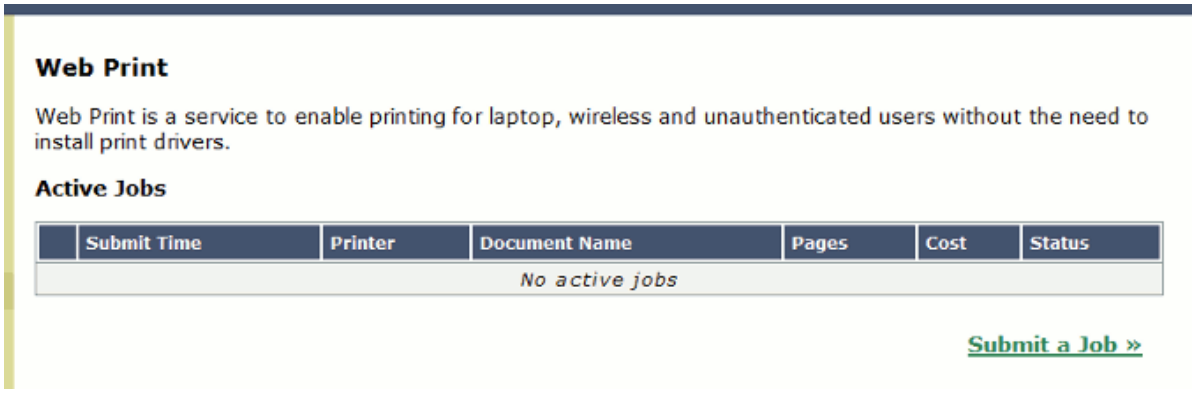


Figure 19.7. The front Web Print page before any jobs have been submitted

The message at the top of this page may be customized, e.g. to include site specific information or other details that users may need to know. See the **Introductory message** option in Figure 19.15, “Web Print settings in the admin interface”.

Web Print
Web Print is a service to enable printing for laptop, wireless and unauthenticated users without the need to install print drivers.
Active Jobs

Figure 19.8. Customizable Web Print introductory message

The administrator may restrict access to the Web Print feature by group, by IP address/range or disable the feature entirely. See Section 19.5.3, “Advanced Web Print Configuration” for details.

3. Click **Submit a Job** to start the Web Print wizard.
4. The first step of the Web Print wizard is selecting a printer. This is the printer that the uploaded document will print to.

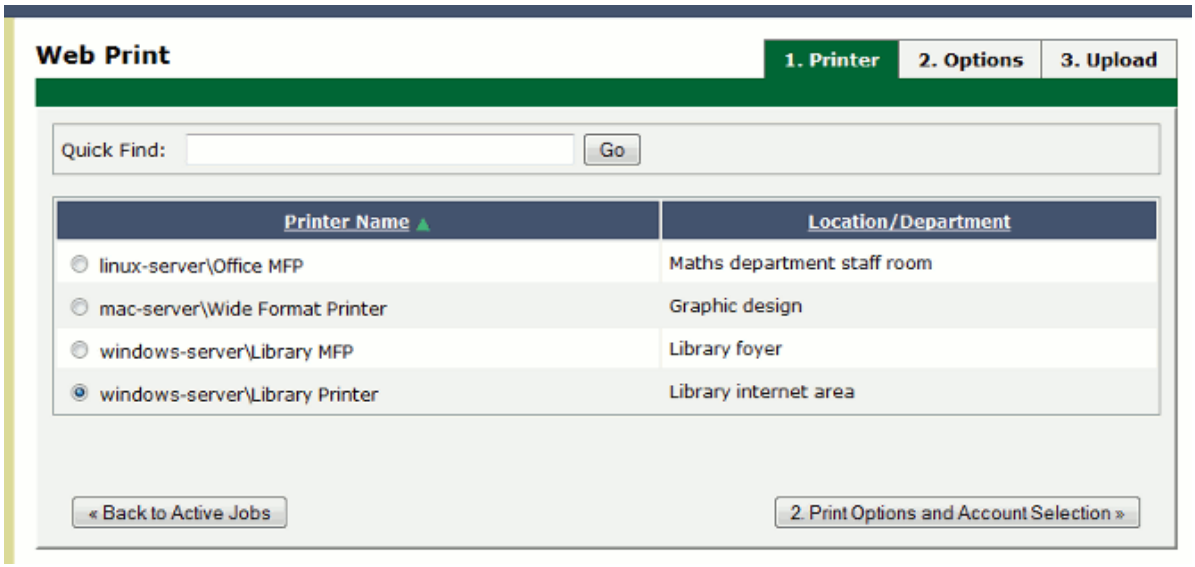


Figure 19.9. Web Print wizard step 1: list of printers available for Web Print

The printers available for Web Print are chosen by the administrator. See Section 19.5, “Web Print Configuration” [283] for details.

The printer list may be replaced with a clickable map or other custom content. See Section 19.5.2, “Designing Printer Maps / Custom Printer Selection Lists” for details.

Tip

Web Print works great in conjunction with hold/release queues and Find Me Printing (print job redirection / load balancing) .

5. After selecting a printer the second step is to select the print and/or account selection options. Most users will simply see an option to select the number of copies to print:

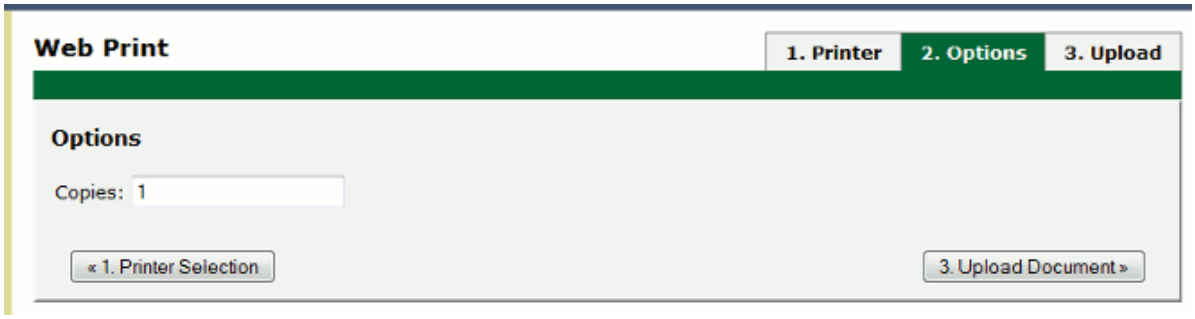


Figure 19.10. Web Print wizard step 2: selecting the number of copies for a Web Print job

The maximum number of copies a user may submit is configurable via the `user.web-print.max-copies` config editor key. See Section 19.5.3, “Advanced Web Print Configuration” for details.

Users with print account selection options (i.e. users who are using an account selection popup) will see additional options on this page, equivalent to what they would see on their popup:

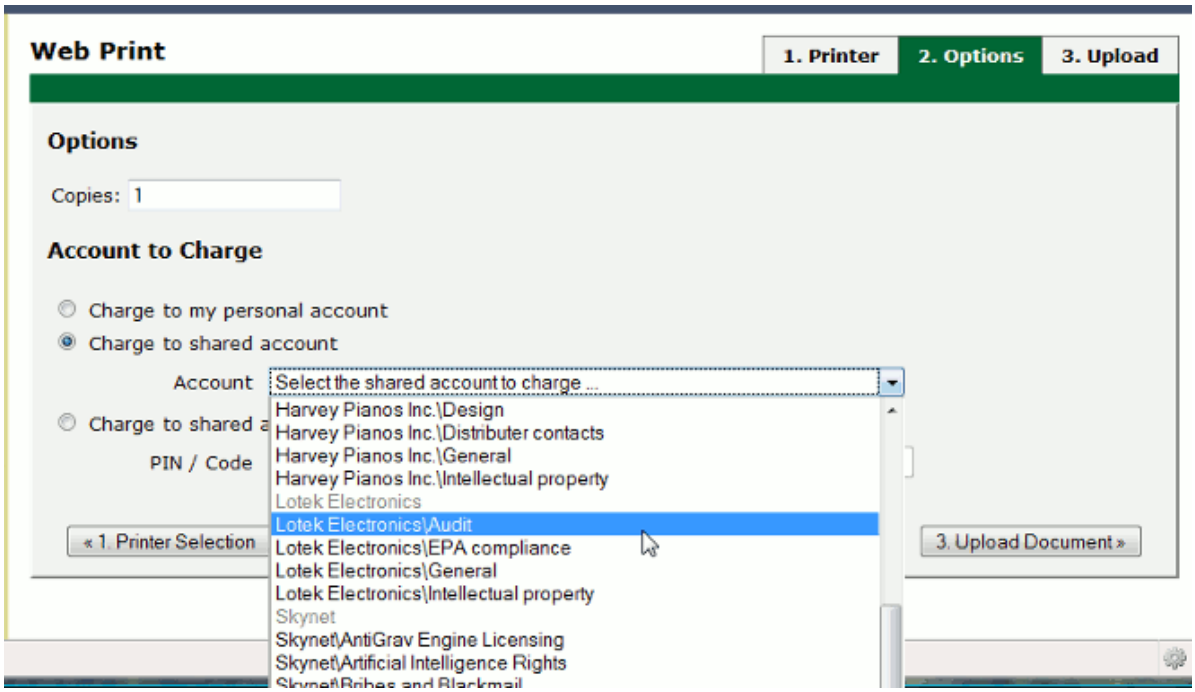


Figure 19.11. Web Print wizard step 2: account selection options

Note

The developers hope to be able to support *grayscale* and *duplex* print options in the near future.

6. After selecting the print options and/or account selection settings, the third and final step in the Web Print wizard is to upload a document to print. This page lists the applications and associated file extensions that are supported.

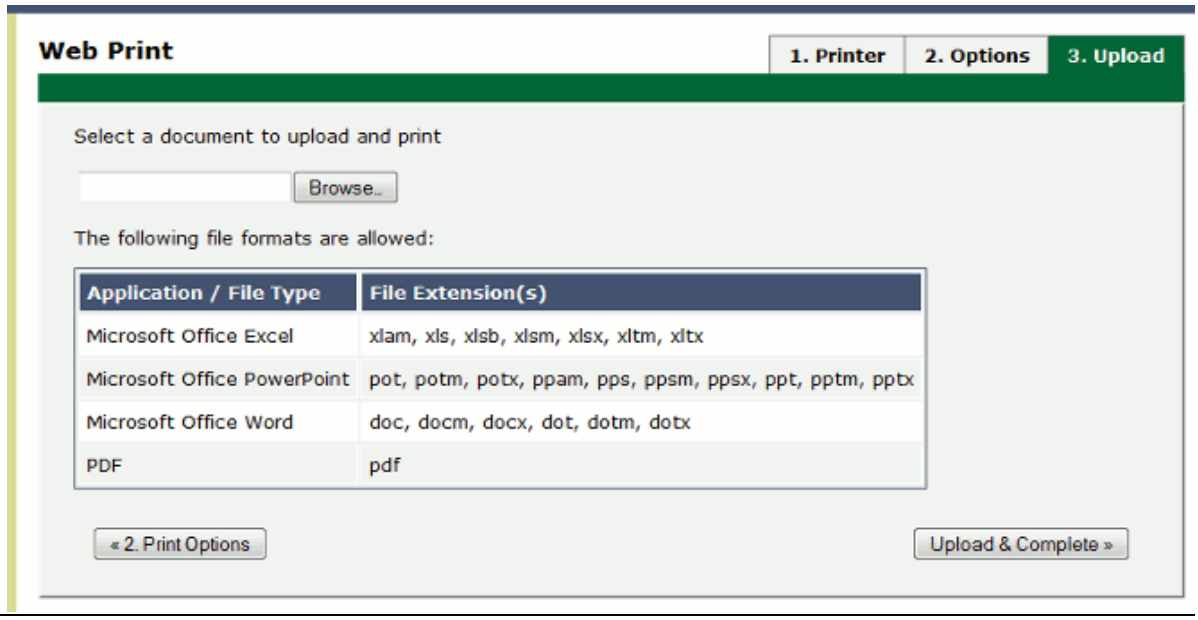


Figure 19.12. Web Print wizard step 3: upload a document

If a supported application/file extension that is listed in Section 19.2.1, “Supported Applications and File Formats” is not shown on this page but you expect that it should be, see Section 19.6, “Troubleshooting Web Print Problems” for assistance.

Once a document has been selected and **Upload & Complete »** is pressed the file will begin uploading to the server.

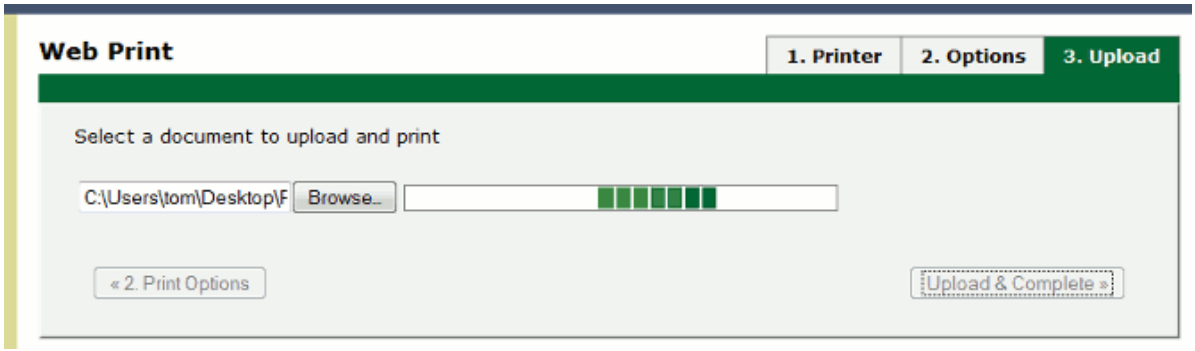


Figure 19.13. Web Print wizard step 3: document upload in progress

The maximum file size a user may upload is configurable, with a default of 100MB. See the option **Maximum document/file upload size** in Section 19.5.3, “Advanced Web Print Configuration” for details.

7. Once the document upload is complete the user is returned to the front Web Print page. The table now displays the status of the user's job. The status will change to indicate the progress of the job from rendering to printing, and job details such as cost and number of pages will be populated when known. The user may stay at this page to track the status of the job or navigate away / close their browser - the job will not be affected.

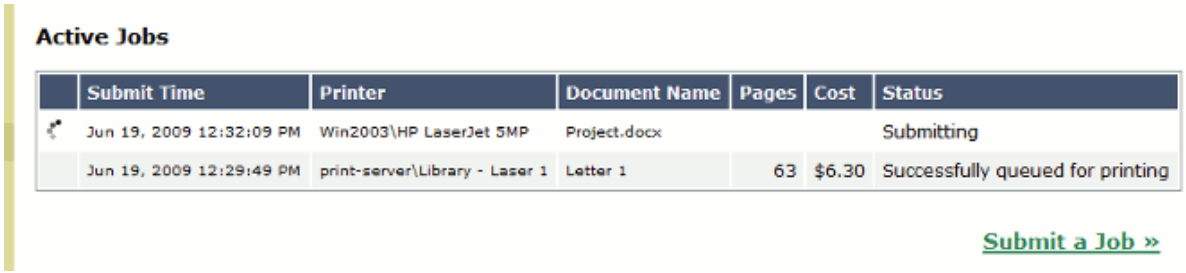


Figure 19.14. List of active Web Print jobs

At this stage the Print-Limit application server accepts the uploaded document and sends it to the Web Print server. The Web Print server renders the document into a print queue by automating the process of opening the application (e.g. Adobe Reader) and printing to the target printer.

19.5. Web Print Configuration

Administrators must nomininate which printers are available for use with Web Print. Smaller organizations may wish to make all printers available. Larger organizations may wish to restrict to a subset, e.g. limiting access to printers located in public areas. A printer may be enabled for use with web print via **Printers** → **[select printer]** → **Advanced Configuration** → **Enable Web Print (users may upload documents to print)**.

Tip

To easily enable all printers for use with Web Print:

1. Select **Enable Web Print functionality** on the [Template printer].
2. Copy the setting to all other printers using Copy settings from printer to printer.

General Web Print configuration settings can be found in the admin interface at **Options** → **General** → **User Features**.

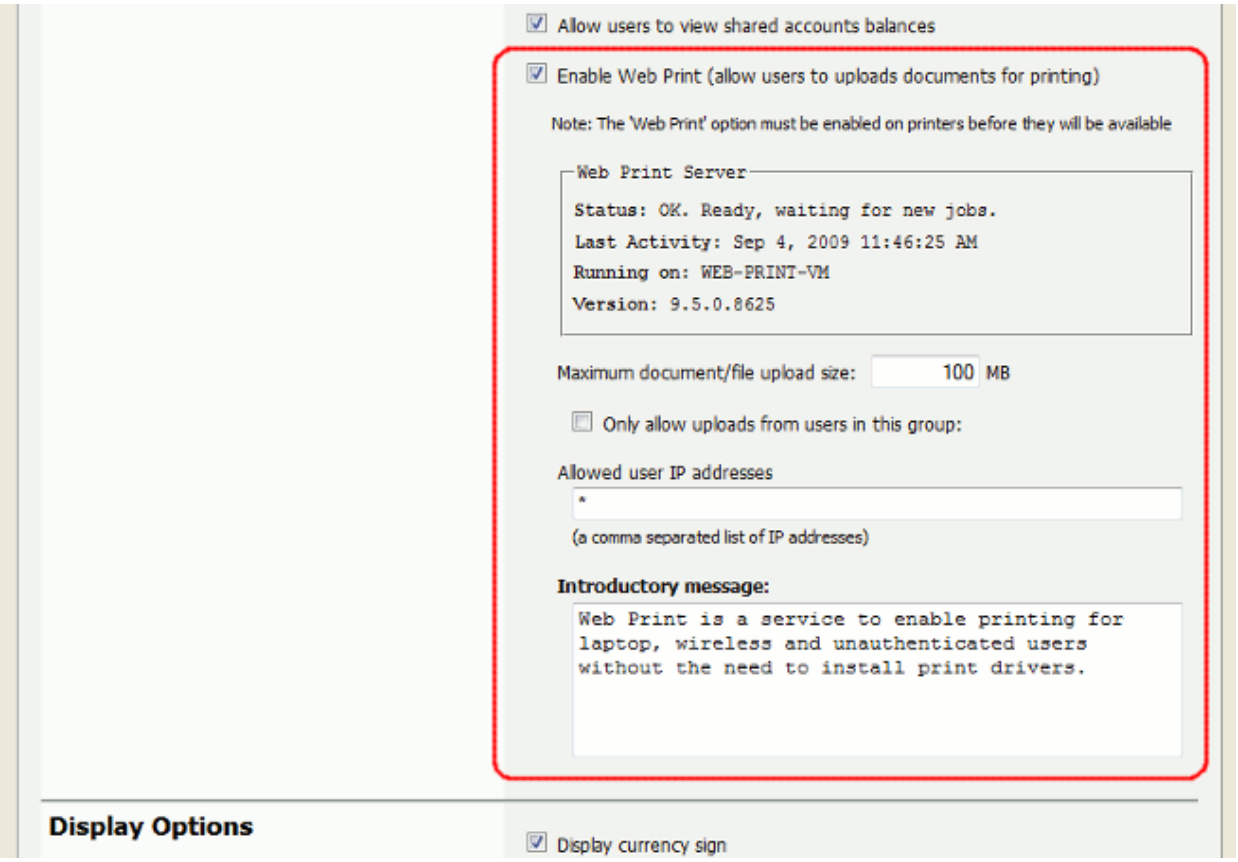

Allow users to view shared accounts balances
Enable Web Print (allow users to uploads documents for printing)
Note: The 'Web Print' option must be enabled on printers before they will be available
Web Print Server
Status: OK. Ready, waiting for new jobs.
Last Activity: Sep 4, 2009 11:46:25 AM
Running on: WEB-PRINT-VM
Version: 9.5.0.8625
Maximum document/file upload size: 100 MB
Only allow uploads from users in this group:
Allowed user IP addresses
*
(a comma separated list of IP addresses)
Introductory message:
Web Print is a service to enable printing for laptop, wireless and unauthenticated users without the need to install print drivers.
Display Options
Display currency sign

Figure 19.15. Web Print settings in the admin interface

Setting	Description
Enable Web Print (allow users to uploads documents for printing)	When enabled a **Web Print** item will appear in the navigation menu of the user web interface, and users will be able to use Web Print functionality. When disabled this item will not be visible and Web Print functionality will not be available to users.
Maximum document/file upload size	If a user uploads a document greater than the specified size (in MB) their upload will be rejected.
Only allow uploads from users in this group	This option may be used to restrict Web Print access to a particular group of users. When this option is enabled users not in the specified group will not see the **Web Print** item in the navigation menu.
Allowed user IP addresses	This option may be used to restrict Web Print access to a select IP address range. For example, access might be limited to systems on a wireless network

Setting	Description
	(i.e. force users on the wired network to use standard print queues). Address ranges may be entered in the format: `1.2.3.0/255.255.255.0`.
Introductory message	This message appears on the first page after a user clicks the **Web Print** item, and can be used to explain the service, offer site-specific advice or other information to assist the user. HTML is supported, e.g. <p> tags may be used to start a new paragraph, or an <a> tag may be used to provide a link.

Table 19.3. Web Print Settings

19.5.1. Print Options for Web Print Jobs

The print options selected during the Web Print wizard are currently limited to the number of copies to print. Other print options such as grayscale, duplex, paper size etc. are selected based on the default options on the print queue.

If it is important to provide the user with a print option choice, e.g. when the same printer has trays for Letter and Legal paper, two print queues may be created and set up with different default settings. E.g. one print queue called `Library Printer (Letter)` that defaults to the Letter size and tray, and a second print queue (pointing to the same physical printer) called `Library Printer (Legal)` that defaults to the Legal size and tray.

> **Note**
>
> The developers hope to be able to support *grayscale* and *duplex* print options in the near future.

19.5.2. Designing Printer Maps / Custom Printer Selection Lists

Part of the Web Print wizard involves selecting the target printer from a list. This is fine most environments, but organizations with many printers or large sites may prefer something that provides users with more context about the printer they are selecting.

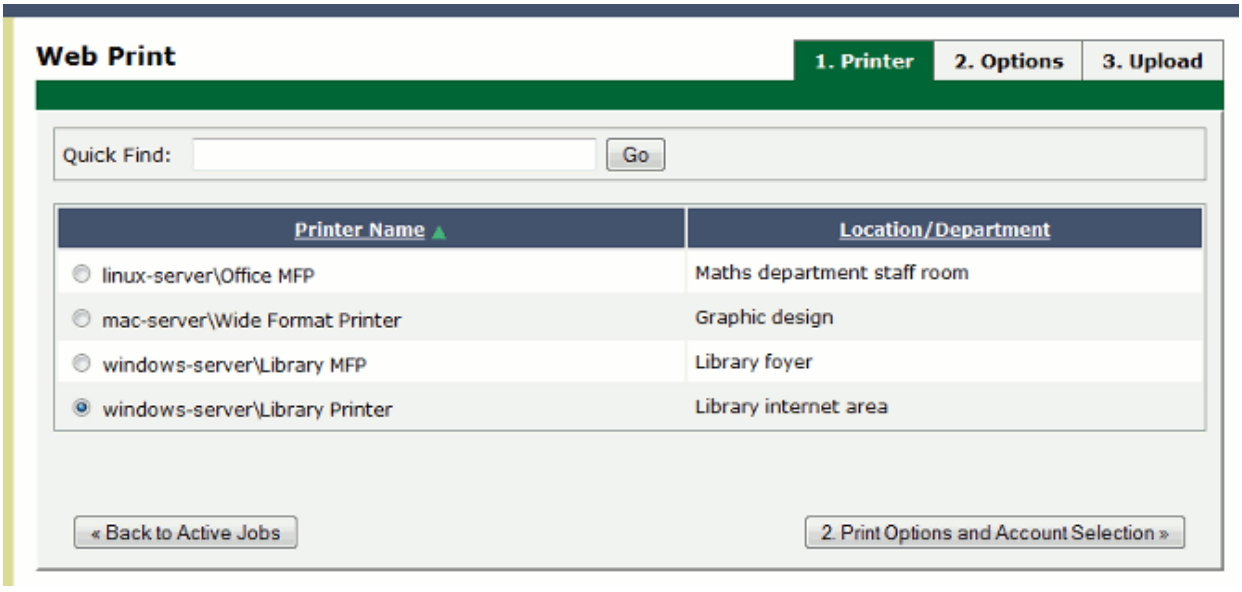


Figure 19.16. Web Print: selecting a printer from the list, which may be replaced with a map or custom list

Using a graphical map can assist users to find the most convenient printer. A map allows a user to select a printer by location, rather than guessing the printer's location based on its name. Using printer maps or other types of custom printer lists in Print-Limit Pro does not require any special or proprietary software - they can easily be implemented using open standards and free software.

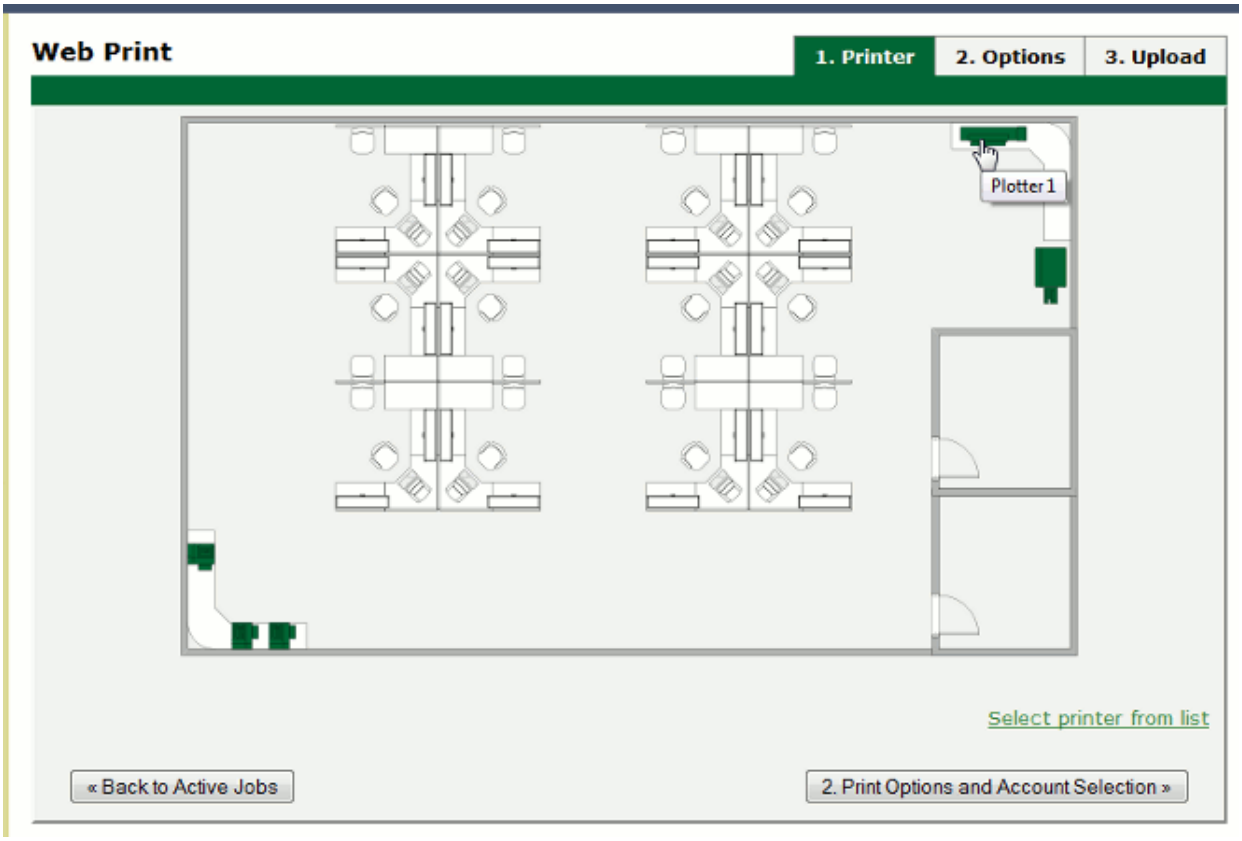


Figure 19.17. Web Print: printer selection map with a simple floor plan

Custom content is loaded in place of the printer list by placing the appropriate file at `[app-path]/server/custom/web/` as described in the following table:

File Name	Description
`printer-map.html`	If this file exists it will be loaded as an HTML page and displayed in an iframe in place of the printer selection list. The HTML may contain any content or images including links to other pages (which will also be loaded in the iframe by default).
`printer-map.svg`	If this file exists it will be loaded as a SVG page and displayed in an iframe in place of the printer selection list. The SVG may contain links to other pages or other SVGs. An SVG may be created using software such as Microsoft Visio or the free/open source Inkscape [http://inkscape.org/], and is a convenient way of displaying a map or floor plan with clickable links.

Table 19.4. Files used for custom printer selection in the Web Print wizard

Tip

Any custom content placed in `[app-path]/server/custom/web/`, such as additional images, can be accessed via a URL beginning with `/custom/`. For example if a file named `floor-plan.png` is

placed in `[app-path]/server/custom/web/` it can be accessed via the URL `/custom/floor-plan.png`.

Tip

The custom printer map is displayed in an iframe with dimensions 776px x 400px. If the content is larger than this then scrollbars will be visible (the area will not be expanded to fit the content).

19.5.2.1. Example 1: Creating a Printer Map Using an HTML Image Map

This example runs through the process of creating a printer map using HTML with image maps. This method is most suitable if you have floor plan images and/or arial photos of your site (e.g. in PNG or JPEG format). If you have a plan in SVG/vector graphic format then Section 19.5.2.2, “Example 2: Creating a Printer Map Using SVG” may be more suitable.

The source for this example can be found at `[app-path]/server/examples/printer-maps/html-image-map/`.

For this example we will create a printer selection map with two layers: a site plan and floor plans. Users first choose a building from the site plan, then choose a printer from the building's floor plan. We have two buildings: *Building A* and *Building B*. Each building has one floor of interest with identical floor plans and five selectable printers.

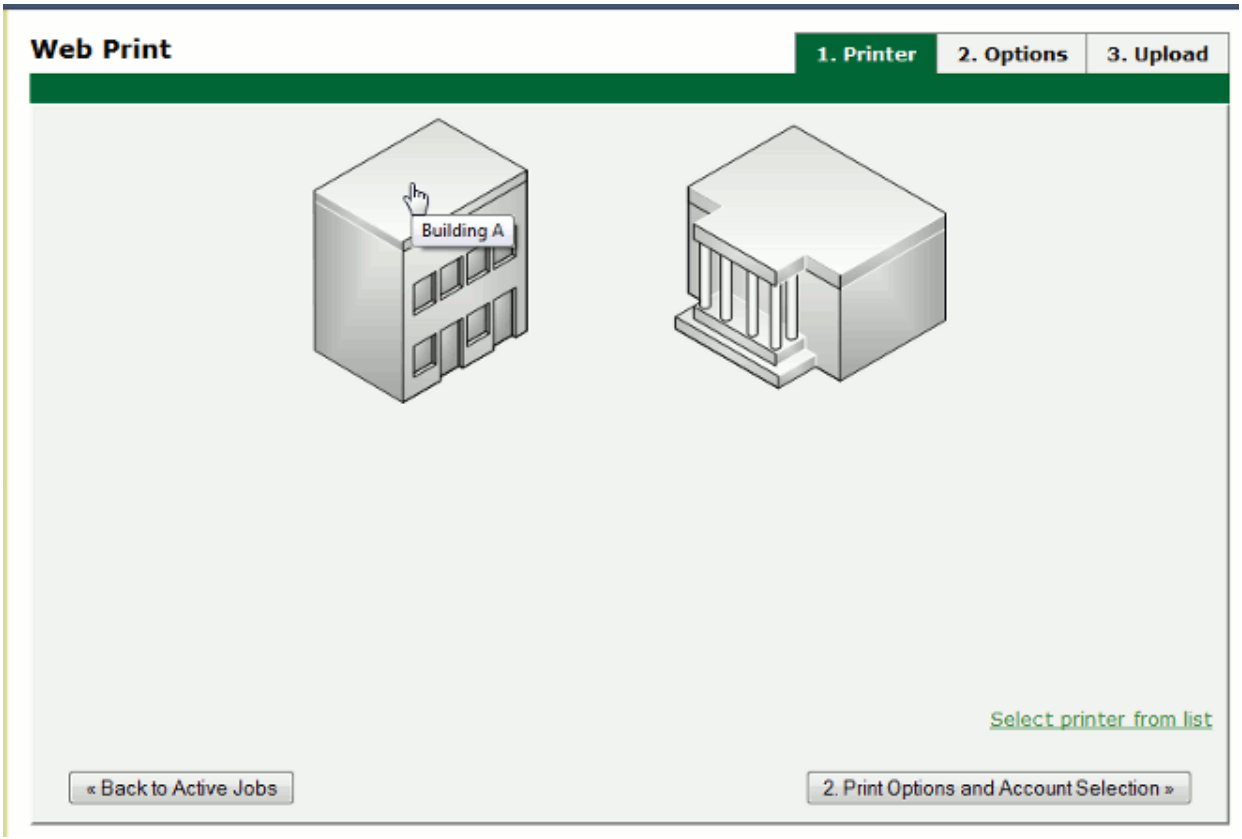


Figure 19.18. Web Print: printer selection map with a simple site plan

1. The first step is to create a file named `printer-map.html` at `[app-path]/server/custom/web/`. This file will be loaded as an HTML page in an iframe in place of the default printer selection list, and may contain any

content you choose, including links to further pages. Open this file in a text editor.

2. We then add the site plan image:

```
<img src="site-plan.png" usemap="#buildings"
     style="width: 422px; height: 190px; border: none;" />
```

   The `usemap="#buildings"` attribute tells the image to look for an image map with the name `buildings`. Image maps allow you to make parts of an image "clickable". For more information about the HTML `<map>` element see xhtml.com's map element reference [http://xhtml.com/en/xhtml/reference/map/].

3. Now we define the image map.

```
<map name="buildings">
  <area shape="poly" coords="" href="building-a.html"
        alt="Building A" title="Building A" />
  <area shape="poly" coords="" href="building-b.html"
        alt="Building B" title="Building B" />
</map>
```

   Here we have defined a new image map called `buildings` with two clickable areas. These areas are polygon shapes (`shape="poly"`), which means we can specify a list of points that will form the outline of the clickable area (i.e. the area inside the points will be clickable).

   Clicking the first area will load the page `building-a.html`. The `alt` and `title` tags provide information about the link and display a tooltip when the user hovers over the area.

4. We have defined two areas and the pages they will link to but we have not yet defined the coordinates for these areas. This is done using the `coords` attribute of the two `area` tags. Using an image editor we can find coordinates for the outline of the two areas. Most image editors, including MS Paint, display pixel coordinates when hovering the mouse over the image.

   Using the image editor we find the following points for *Building A* (the lefthand building), starting from the top left corner, in `(x,y)` format: `(0,48), (84,0), (143,34), (143,142), (60,190), (0,155)`. Pixels are counted from the top left corner of an image, so the coordinate `(60,190)` means *"60 pixels from the top, 190 pixels from the left"*.

5. We repeat the previous step for the second building to get coordinates similar to: `(242,50), (320,4), (422,63), (422,135), (332,190), (226,131)`.

6. Now that we have the clickable area coordinates we can define them in our image map.

   The definition for the `area` tag when using a `poly` type shape tells us that the coordinates are specified in a list of x,y coordinates (i.e. "x1,y1,x2,y2...xn,yn"), so we enter the coordinates in the `coords` attributes as follows:

```
<map name="buildings">
  <area shape="poly"
        coords="0,48,84,0,143,34,143,142,60,190,0,155"
        href="building-a.html" alt="Building A"
        title="Building A" />
  <area shape="poly"
        coords="242,50,320,4,422,63,422,135,332,190,226,131"
        href="building-b.html" alt="Building B"
        title="Building B" />
</map>
```

7. Opening `printer-map.html` in a web browser should now display the site plan image. Hovering the mouse over each building should display the link cursor and indicate a link to the respective pages.

8. The next step is to create the `building-a.html` page. Using a similar process to the existing page we add `floor-plan.png` and create an image map for it:

```
<img src="floor-plan.png" usemap="#printers"
     style="width: 600px; height: 362px; border: none;" />

<map name="printers">
  <area shape="rect" coords="4,289,22,307" href=""
```

```
        alt="building-a\Printer 1"
        title="building-a\Printer 1" />
  <area shape="rect" coords="33,342,51,360" href=""
        alt="building-a\Printer 2"
        title="building-a\Printer 2" />
  <area shape="rect" coords="58,342,76,360" href=""
        alt="building-a\Printer 3"
        title="building-a\Printer 3" />
  <area shape="rect" coords="521,7,566,23" href=""
        alt="building-a\Plotter 1"
        title="building-a\Plotter 1" />
  <area shape="rect" coords="571,88,592,129" href=""
        alt="building-a\MFP 1"
        title="building-a\MFP 1" />
</map>

<div>Building A (<a href="printer-map.html">back</a>)</div>
```

This map is mostly similar to the previous one, except that we have defined five rectangle shapes (`shape="rect"`) and provided a link back to the main site plan (`printer-map.html`).

Rectangle shapes in an `<area>` element are defined with the coordinates of top left and bottom right corners (`"x1,y1,x2,y2"`).

9. Now we have the images and shapes in place for the site plan and one building's floor plan. To finish off this building we now need to define what happens when each printer is clicked. This is done using a JavaScript function `selectPrinter`. Calling `selectPrinter('my-server', 'Library Printer')` will submit the form on this step of the Web Print wizard, selecting the printer called `Library Printer`, hosted on the print server called `my-server`.

   We can call this JavaScript function when one of the defined areas is clicked by setting the `href` attribute as follows:

   ```
   <area shape="rect" coords="4,289,22,307"
         href="javascript:parent.selectPrinter('building-a',
                                               'Printer 1');"
         alt="building-a\Printer 1"
         title="building-a\Printer 1" />
   ```

10. Repeat the previous step for the remaining printers, taking care that the server and printer names are entered correctly. Note that the printer name is the printer's unique name on the print server, and may be different to the printer's "share name".
11. Repeat the steps to create `building-a.html` to create `building-b.html` (or simply copy the file and modify to suit).
12. Test the Web Print wizard to ensure that clicking on a building takes you to that building's floor plan, and clicking on a printer submits the form to select that printer. Note that if the names you've used for the printers don't actually exist in your Print-Limit Pro server then you'll see an error message about the printer not being available. You may like to modify the details for one of the printers to match a real printer so that the wizard can be tested end-to-end.

    The source for this example contains some additional tweaks to improve browser consistency, such as removing the border and white background of the iframe in Internet Explorer.

19.5.2.2. Example 2: Creating a Printer Map Using SVG

This example explains how to use an SVG image for a clickable printer map. This method is most suitable if you have plans or drawings in a vector format that can be saved as SVG. Otherwise Section 19.5.2.1, “Example 1: Creating a Printer Map Using an HTML Image Map” may be more suitable.

An example SVG floor plan with clickable printers can be found at `[app-path]/server/examples/printer-maps/html-image-map/`.

Modern web browsers are capable of displaying an SVG file in a similar way to displaying a web page. Mozilla Firefox and Opera can display SVGs "out of the box", and Microsoft Internet Explorer can display SVGs using the Adobe SVG Viewer [http://www.ieaddons.com/en/details/Time_Savers/Adobe_SVG_Viewer/] add-on. In addition to drawing the image parts of the image may be made "clickable" to provide links to other pages or, as in this case, to call a JavaScript function that selects a printer.

In this example we will describe how to take an existing SVG image and make parts of it clickable so that a printer may be selected.

Tip

A Microsoft Office Visio drawing can be saved as SVG and used in this example.

1. Download and install Inkscape [http://inkscape.org/], the free/open source vector graphics editor, and use it to open your SVG.
2. Select the object that should be made "clickable". You should see a dotted background around the object.
3. Right-click the object and select **Create Link**.
4. Right-click the object and select **Link Properties**.
5. In the **Link Properties** dialog that appears, enter a value for the **Href** field like: `javascript:parent.selectPrinter('server', 'printer');`, where `server` is the name of the print server and `printer` is the name of the print queue.
6. Repeat to create links for each printer in the image.
7. Select **File** → **Save As...** and choose a file type of `Plain SVG (*.svg)`. Save the image to `[app-path]/server/custom/web/printer-map.svg` on the Print-Limit Pro server.
8. Try the Web Print wizard to test. The SVG should be visible on the first step of the Web Print wizard in place of the printer list. Clicking a print should move on to the next step.

19.5.3. Advanced Web Print Configuration

The following advanced configuration options are available via the config editor. See Section 12.9, “Using the Config Editor” for information about using the config editor.

Config Name	Description
web-print.job-idle-timeout-mins	If a Web Print job remains unchanged for longer than this period of time it is considered finished and is "cleaned up". The document and associated files are removed, and the job will no longer appear in the user's list of current Web Print jobs. The default idle job timeout is 20 minutes.
web-print.job-rendering-timeout-mins	The Web Print server is given this length of time to render a Web Print document. If a print job has not been generated from the document after this time the job is marked as errored and associated files are removed. The default job rendering timeout is 5 minutes.
web-print.max-copies	This is the maximum number of copies a user may print via Web Print. This option exists to prevent users accidentally (or thoughtlessly!) printing too much.
web-print.hot-folder	When a user uploads a file via the Web Print interface is it written into the "hot folder" along with a `.metadata` file containing information about how to print the job (data selected by the user in the Web Print wizard). The Web Print server looks for new files in this folder and prints them as required. The default hot folder location is `[app-path]/server/data/web-print-hot-folder/`. An alternate location can be specified using this config key. The location must be local to the Print-Limit Pro primary server (it cannot be a network share or mapped drive due to Windows denying share access to the `SYSTEM` account).

Table 19.5. Web Print Config Editor Keys

The following configuration options are available in the Web Print server configuration file, located at `[app-path]/providers/web-print/[platform]/web-print.conf`.

Config Name	Description
hotfolder	The location of the Web Print hot folder. This is generally a mapped drive letter (Windows) or a mount point that maps to a file share (Mac, Linux). It may also be a local path, if the Web Print server software is running on the same system as the Print-Limit Pro primary server.
debug	Set to on to enable debug logging.

Table 19.6. Web Print Server Config File

19.6. Troubleshooting Web Print Problems

19.6.1.1.
Why are some file formats not available? (Supported file formats listed in Section 19.2.1, “Supported Applications and File Formats” are not listed under **Options** → **General** → **Web Print** → **Status** page or not accepted when uploading a file.)

First check Section 19.2.1, “Supported Applications and File Formats” to see that the file format is supported in the mode that the Web Print server is running in. Some file formats are only supported in sandbox mode.

Next ensure that the associated application is installed and working. If running in sandbox mode, log in as the `webprint` user, open and print a document with the application to ensure the user has the correct permissions.

The next step is to check the Web Print log files. The Web Print server has a *handler* for each supported application. Each handler has a log file, which may provide more information about why the file format is not available. The handler log files are named `web-print-handler-*.log`, where `*` is the name of the application. See Q: 19.6.1.3 for the location of the Web Print logs folder.

Open the log file that matches the application of interest (e.g. `web-print-handler-mso-word.log` for Microsoft Office Word documents) in a text editor. Check the log file for any obvious errors, such as not being able to find the application or problems launching it.

For further assistance contact support.

19.6.1.2.
The status in the admin interface or on the Web Print dialog is indicating an error. What can I do?

The Web Print server is not running or could not be contacted
When running in *simple mode*:

- The service `Print-Limit Web Print Server` should be running.

When running in *sandbox mode*:

- The Web Print dialog should be visible on the Web Print server, and the **Status** should not indicate any error.
- While logged onto the Web Print server as the `webprint` user, ensure that the mapped `W:` drive is accessible and maps to `[app-path]/server/data/web-print-hot-folder/` on the Print-Limit Pro primary server.
- Open `[app-path]/providers/web-print/[platform]/web-print.conf` on the Web Print server in a text editor and ensure that the `hotfolder=` option is set to `W:`.

For further assistance contact support.

The Web Print service is running as the SYSTEM account and does not have access to render print jobs
If running Web Print in *simple* mode, check the steps listed in Section 19.3.1.1, “Web Print Simple Mode Setup for Windows Servers (PDF Only)” to ensure that the service has been correctly configured to run as the `webprint` user account.

If running Web Print in *sandbox* mode this error may indicate that the service `Print-Limit Web Print Server` is running. This service is not required in sandbox mode and should be *disabled*.

No valid handler programs installed/defined
See Q: 19.6.1.1.

The configured hot folder location is not writable.

- Check that the location indicated by **Hot folder** on the Web Print dialog is correct.
- As the `webprint` user, navigate to the drive/directory that is mapped to the `PCWebPrint` share (`W:` on Windows). Try creating an empty text file. If this action fails there is a problem with permissions. Check the **Sharing** and **Security** (NTFS/file) permissions for the `PCWebPrint` share on the Print-Limit primary server. The `webprint` user should be allowed read and write access.
- For further assistance contact support.

Other error messages
Check the Web Print server log file `web-print.log`. See Q: 19.6.1.3 for the location of the logs directory. For further assistance contact support.

19.6.1.3.
Where is the Web Print logs folder?

The logs folder is located on the system running the Web Print server software.

On Windows the location of the logs folder depends on configuration and the Windows edition. Logs may be written to `[app-path]\providers\web-print\win\logs\`, or to `%USERPROFILE%\web-print-logs\` (e.g. `C:\Users\[username]\web-print-logs\` on Windows Vista/2008. For a definitive answer open the file `[app-path]\server\data\web-print-hot-folder\web-print-server.status` on the primary Print-Limit Pro server in a text editor and check the line beginning `server.log-file=`.

19.6.1.4.
Why is my print queue "currently not available"?

When using the Web Print interface, some print queues are giving me an error message: **Errored: Printer '\\servername\queuename' is currently not available.**

This can be caused by trying to use Web Print on a print queue that has been deleted or by trying to print to a print queue that is not installed on the Web Print Sandbox. Please confirm this by logging into the Web Print Sandbox as the Web Print user and attempting to print to the above print queue.

> **Note**
>
> It is important that the jobs pass via the queue on the server - do not add a Local Printer. You should also use add the printers using the print server's machine name and not an IP address.

19.7. XPS Viewer Installation Instructions

Microsoft Windows 7, XP, Vista and Server 2003 administrators can easily install the Microsoft XML Paper Specification Essentials Pack (XPSEP), which contains the XPS viewer, from the Microsoft website. Versions for both 32bit and 64bit are available.

- Microsoft XML Paper Specification Essentials Pack [http://www.microsoft.com/downloads/details.aspx?FamilyID=b8dcffdd-e3a5-44cc-8021-7649fd37ffee]

Customers running Microsoft Windows Server 2008 must install the XPS Viewer from the Features module of the Server Manager MMC snap-in.

1. Load the Server Manager MMC snap in via **Start menu** → **Administrative Tools** → **Server Manager**

2. Right Click on **Features** and select **Add Feature**
3. Check the tickbox for "XPS Viewer", click **Next**

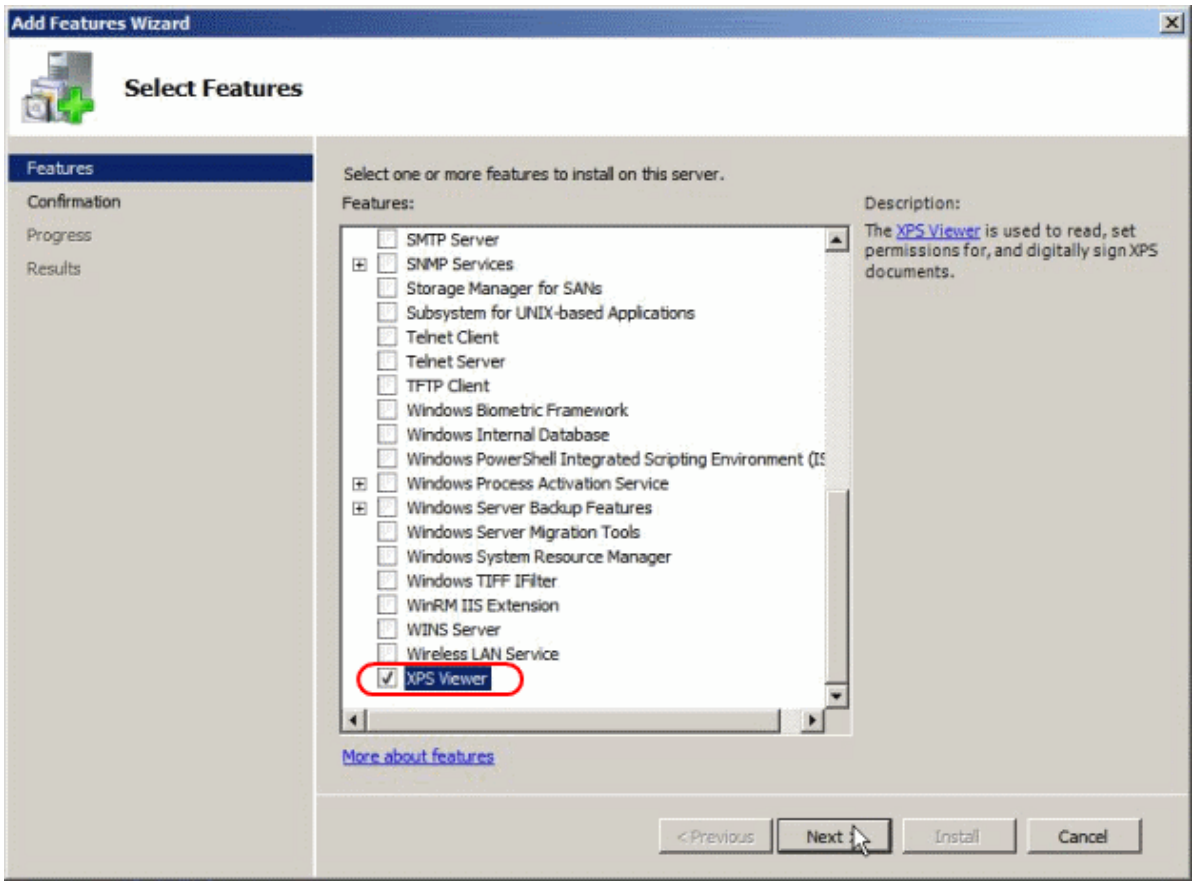


Figure 19.19. Installing the XPS Viewer for Windows Server 2008

4. Click **Install** on the Confirm Installation Selections dialogue box.
5. Click **Close** when the installation is complete.

Chapter 20. Clustering and High Availability

20.1. About Clustering

Print-Limit Pro is designed to scale to networks over 50,000 users (largest deployments are running over 300,000 users). To ensure reliability on networks of this size, network architects may adopt strategies including:

- Load balancing - spreading tasks across multiple servers.
- Clustering - building in redundancy by implementing a failover strategy.

Print-Limit Pro is a cluster compatible application. It supports clustering at all levels of the application, including

- Clustering at the print spooler service layer by integrating with clustering services.
- Failover based clustering at the application server layer using clustering services. (Print-Limit Pro's application server is web and web services based, and hence can support other failover methods such as heartbeat driven DNS).
- At the database layer by utilizing cluster aware databases such as Microsoft SQL Server or Oracle.

Setting up Print-Limit Pro in a cluster environment is an advanced operation. This chapter assumes the reader has a high level of expertise in system and cluster configuration. The cluster environment should be operational *before* undertaking the Print-Limit Pro installation. Readers should also have a good understanding of Print-Limit Pro's Service Oriented Architecture - specifically its two main components, the *Application Server* and the *Print Provider* and how they work together (Section 14.4, “Print Monitoring Architecture”).

In a cluster environment, Print-Limit Pro can be set up in one of two possible configurations.

Mode 1 is the simplest configuration and is suitable for most organizations. It implements clustering in the “front line”, that is, the printer and print monitoring layer. The cluster print server is configured as a secondary print server reporting back to a primary Print-Limit server hosted on another system outside the cluster.

Mode 2 implements clustering on all levels of the application for maximum fault tolerance - In addition to the print queues, the Print-Limit Application Server is also hosted in the cluster. *Mode 2* is somewhat more demanding to configure and should only be attempted by organizations with staff experienced with advanced cluster and database management.

Please refer to the subsequent sections for an explanation on how to set up *Mode 1* or *Mode 2* in your environment.

This section assumes that you have an already installed and working clustered printing environment.

20.2. Microsoft Cluster Server (MSCS) on Windows

This section discusses both *Mode 1* and *Mode 2* configuration in Microsoft Cluster Server. Sites using Microsoft Failover Cluster Manager, Veritas Cluster Server or Novell Cluster Services should jump to the following sections.

This section assumes that you have an already installed and working clustered printing environment.

20.2.1. Mode 1 - Clustering at the Print Provider layer

The *Print-Limit Print Provider* is the component that integrates with the print spooler service and provides information about the print events to the *Print-Limit Application Server*. At a minimum, in a cluster environment, the *Print Provider* component needs to be included and managed within the cluster group. The *Application Server* component (The **Standard Install** option in the installer) is set up on an external server outside the cluster. Each node in the cluster is configured to report back to the single application server using XML web services over TCP/IP.

20.2.1.1. Step 1 - Application Server (Primary Server) Setup

Install the *Application Server* component (**Standard Install** option) on your nominated system. This system will be responsible for providing Print-Limit Pro's web based interface and storing data. In most cases this system will not host any printers and is dedicated to the roll of hosting the Print-Limit Application Server. It may be one of the nodes in the cluster; however a separate system outside the cluster is generally recommended. An existing domain controller, member server or file server will suffice.

20.2.1.2. Step 2 - Installing the Print Provider components on each node

The *Print Provider* component needs to be separately installed on each node involved in the print spooler cluster. This is done by selecting the **Secondary Print Server** option in the installer. Follow the secondary server set up notes as detailed in Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers* . Take care to define the correct name or IP address of the nominated application server set up in step 1.

20.2.1.3. Step 3 - Decouple service management from nodes

By default the *Print Provider* component is installed under the management of the node. To hand over management to the cluster, the service start-up type needs to be set to manual. On each node navigate to **Control Panel** → **Administrative Tools** → **Services**, locate the `Print-Limit Print Provider` service. *Stop* the service and set the start-up type to **Manual**. Repeat for each node in the cluster.

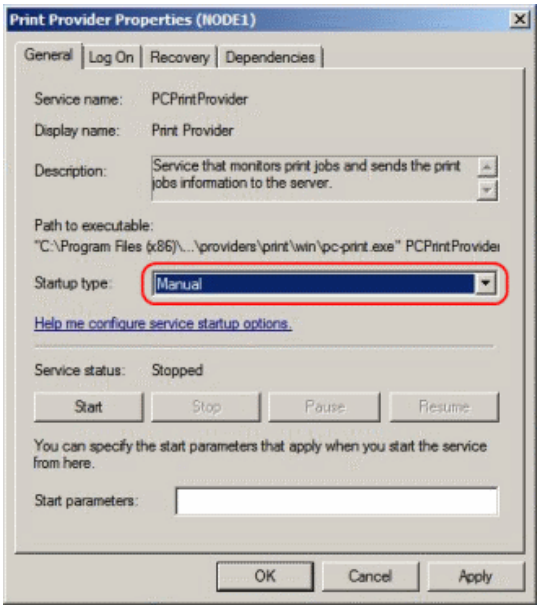


Figure 20.1. Stopping the service and setting to Manual startup

20.2.1.4. Step 4 - Adding the Print Provider service as a resource under the print spooler's cluster group

1. Open the **Cluster Administrator**.
2. Right-click on the cluster group hosting the spooler service and select **New** → **Resource**.

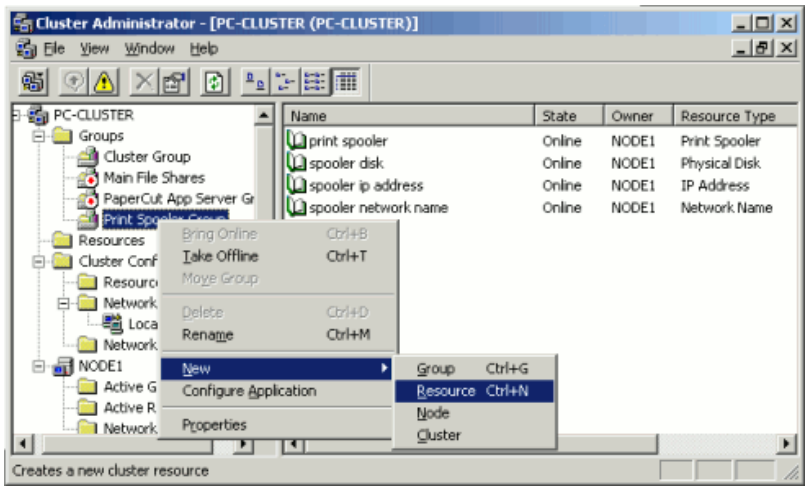


Figure 20.2. Creating a new cluster resource

3. In the new resource wizard, enter a name of `Print-Limit Print Provider` and select a resource type of **Generic Service**. Click **Next**.
4. Click **Next** at **Possible Owners**.
5. Ensure that the `Print Spooler Service` resource is set as a required dependency, then click **Next**.
6. On the **Generic Service Parameters** page, enter a service name of `PCPrintProvider` and ensure the **Use Network Name for computer name** option is *checked*. Click **Next**.

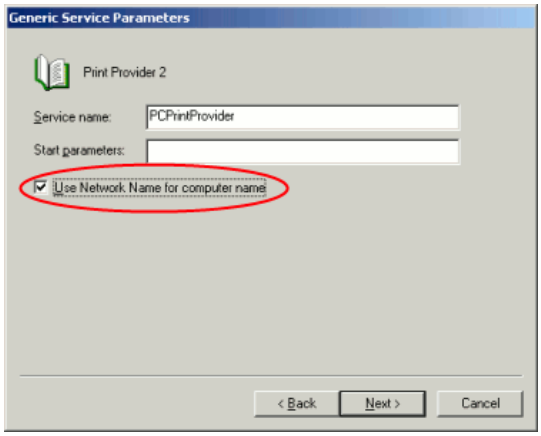


Figure 20.3. Cluster service parameters configuration

7. Click **Finish** at the **Registry Replication** page.

20.2.1.5. Step 5 - Shared active job spool

To ensure the state of jobs currently active (e.g. held in a hold/release queue) are not lost during a failover event, Print-Limit Pro is able to save job state in a shared drive/directory. If a shared disk resource is available and can be added to the cluster resource, Print-Limit Pro can use this to host a shared spool directory to ensure no active job state is lost.

1. Add a shared drive to the cluster resource. e.g. (Q: drive). It is advisable to use the same drive as used for the shared print spool directory.

2. Create a directory in this drive called `Print-Limit ProSpool`
3. Create a sub-directory in `Print-Limit ProSpool` called `activejobs`
4. On *each* node, edit the file: `[app-path]/providers/print/win/print-provider.conf` and add a line pointing to the shared active job spool directory:

```
ActiveJobsSpoolDir=Q:\Print-Limit Pro\Spool\activejobs\
```

Change the drive letter as appropriate.

Important

If running an "Active-Active" print cluster you must use a separate active job spool directory for each node. To configure this use the `%service-name%` value in the `ActiveJobsSpoolDir` setting. The `%service-name%` value is replaced by the service name of the running **Print-Limit Print Provider** instance. e.g.

```
ActiveJobsSpoolDir=Q:\Print-Limit Pro\Spool\%service-name%\activejobs\
```

20.2.1.6. Step 6 - Bring up all cluster resources and test

Perform operations to verify that:

1. Print jobs log as expected.
2. No error message appear in the Print Providers text log located at: `C:\Program Files\Print-Limit Pro\providers\print\win\print-provider.log` on each node.

20.2.1.7. Active/Active Clustering - Special notes regarding multiple virtual servers

On large networks it is common to distribute load by hosting print spooler services under two or more virtual servers. For example, two virtual servers may each host half of the organization's printers and hence sharing the load. This is sometimes referred to as Active/Active clustering - all be it not an entirely correct term, as the print spooler is still running in Active/Passive.

Virtual servers cannot share the same service on any given node. For this reason if the virtual servers share nodes, you'll need to manually install the `Print-Limit Print Provider` service a second time under a different name. This can be done via the command line as follows:

```
cd C:\Program Files\Print-Limit Pro\providers\print\win
pc-print.exe PCPrintProvider2 /install
```

The argument proceeding `/install` is the unique name to assign to the service. The recommended procedure is to suffix the standard service name with a sequential number.

20.2.2. Mode 2 - Clustering at all application layers

Mode 2 implements failover clustering at all of Print-Limit Pro's Service Oriented Architecture software layers, including:

- Clustering at the Print monitoring layer
- Clustering at the Application Server layer
- Optional clustering at the database layer

Mode 2 builds upon *Mode 1* by introducing failover (Active/Passive) clustering in the *Application Server* layer. This involves having an instance of the application server on each of the cluster nodes. When one node fails, the other automatically takes over the operation. Both instances use a share data source in the form of an external database (see Chapter 18, *Deployment on an External Database (RDBMS)*). Large sites should consider using a clustered database such as Microsoft SQL Server.

This section assumes that you have an already installed and working clustered printing environment.

20.2.2.1. Step 1 - Application Server Installation

On one of the cluster's nodes, install the Print-Limit Application Server component by selecting the **Standard Install** option in the installer. Follow the setup wizard and complete the process of importing all users into the system.

20.2.2.2. Step 2 - Convert the system over to an external database

The system needs to be configured to use an external database as this database will be shared between both instances of the application server. Convert the system over to the required external database by following the procedure detailed in Chapter 18, *Deployment on an External Database (RDBMS)*. The database may be hosted on another system, or inside a cluster. As per the external database setup notes, reference the database server by IP address by entering the appropriate connection string in the `server.properties` file.

20.2.2.3. Step 3 - Setup of 2nd Node

Repeat steps 1 and 2 on the second cluster node.

20.2.2.4. Step 4 - Decouple service management from the nodes

By default the `Print-Limit Application Server` component is installed under the management of the node. It needs to be managed inside the cluster, so the service's start-up type should be set to manual. On each node navigate to **Control Panel** → **Administrative Tools** → **Services** locate the **Print-Limit Application Server**. *Stop* the service and set its start-up type to **Manual**. Repeat this on both nodes.

20.2.2.5. Step 5 - Create a new cluster group

The `Print-Limit Application Server` should be designated to run inside its own cluster group. Create a new cluster group containing the two nodes. Add an **IP Resource** and a **Network Name** resource. Give the network name resource an appropriate title such as `PCAppSrv`.

The need for a new cluster group is not hard and fast. It is however recommended as it gives the most flexibility in terms of load balancing and minimizes the potential for conflicts.

20.2.2.6. Step 6 - Adding the Print-Limit Application Service as a resource managed under the new cluster group.

1. Open the **Cluster Administrator**.
2. Right-click on the cluster group hosting the spooler service and select **New** → **Resource**.
3. In the new resource wizard, enter a name of `Print-Limit Application Server` and select a resource type of **Generic Service**. Click **Next**.
4. Click **Next** at **Possible Owners** page.
5. Click **Next** at **Dependency** page.
6. On the **Generic Service Parameters** page, enter a service name of `PCAppServer` and ensure the **Use Network Name for computer name** option is *checked*. Click **Next**.
7. Click **Finish** at the **Registry Replication** page.

20.2.2.7. Step 7 - Bring the cluster group online

Right-click on the cluster group and select **Bring online**. Wait until the application server has started, then verify that you can access the system by pointing a web browser to :

```
http://[Virtual Server Name]:9191/admin
```

Login, and perform some tasks such as basic user management and User/Group Synchronization to verify the system works as expected.

20.2.2.8. Step 8 - Set up the Print Provider layer

Interface the *Print-Limit Print Provider* layer with the clustered spooler service by following the same setup notes as described for *Mode 1*. The exception being that the IP address of the application server will be the IP address assigned to the Virtual Server assigned in step 5.

20.2.2.9. Step 9 - Client Configuration

The client and release station programs are located in the directories:

- `[app-path]/client/`
- `[app-path]/release/`

These directories contain configuration files that instruct the client to the whereabouts of the server. The IP address and the server name in the following set of files will need to be updated to the Virtual Server's details (Name and IP address):

- `[app-path]/client/win/config.properties`
- `[app-path]/client/linux/config.properties`
- `[app-path]/client/mac/PCClient.app/Contents/Resources/config.properties`
- `[app-path]/release/connection.properties`

Edit the files using Notepad or equivalent and repeat this for each node. Also see Section 20.6, “Client/Workstation Configuration”.

20.2.2.10. Step 10 - Test

Mode 2 setup is about as complex as it gets! Take some time to verify all is working and that Print-Limit Pro is tracking printing on all printers and all virtual servers.

20.2.2.11. Advanced: Load distribution and independent groups

It is possible to split the two application layers (Resources) into two separate Cluster Groups:

- Group 1: Containing only the `Print-Limit Application Server` service.
- Group 2: Containing the `Print-Limit Print Provider` and `Print Spooler` services. These services are dependent and hence must be hosted in the same group.

Separating these resources into to groups allows you to set up different node affinities so the two groups usually run on separate physical nodes during normal operation. The advantage is that the load is spread further across the systems and a failure in one group will not necessarily fail-over the other.

To make this change after setting up the single group Mode 2 configuration:

1. Change the `ApplicationServer=` option in `[app-path]/providers/print/win/print-provider.conf` on each physical node to the IP or DNS name of the virtual server.
2. Create a new group called `Print-Limit Application Server Group`.
3. Set the **Preferred owners** of each group to different physical nodes.
4. Restart or bring on line each group, and independently test operation and operation after fail-over.

20.2.3. Clustering Tips

Tip

Take some time to simulate node failure. Monitoring may stop for a few seconds while the passive server takes over the role. Simulating node failure is the best way to ensure both sides of the Active/Passive setup is configured correctly.

It is important that the version of Print-Limit Pro running on each node is identical. Ensure that any version updates are applied to all nodes so versions are kept in sync.

The Print-Limit Pro installation sets up a read-only share exposing client software to network users. If your organization is using the zero-install deployment method, the files in this share will be accessed each time a user logs onto the network. Your network may benefit from exposing the contents of this share via a clustered file share resource.

20.3. Microsoft Failover Cluster Manager (MSFCM)

This section documents the setup for Microsoft Failover Cluster Manager as introduced in Windows 2008 Server R2. Sites using Microsoft Cluster Services, Veritas Cluster Server or Novell Cluster Services should jump to their respective sections.

This section assumes that you have an already installed and working clustered printing environment.

Mode 1 is the simplest configuration and is suitable for most organizations. It implements clustering in the “front line”, that is, the printer and print monitoring layer. The cluster print server is configured as a secondary print server reporting back to a primary Print-Limit server hosted on another system outside the cluster.

Mode 2 implements clustering on all levels of the application for maximum fault tolerance - In addition to the print queues, the Print-Limit Application Server is also hosted in the cluster. *Mode 2* is somewhat more demanding to configure and should only be attempted by organizations with staff experienced with advanced cluster and database management.

Please refer to the subsequent sections for an explanation on how to set up *Mode 1* or *Mode 2* in your environment.

Important

Windows Server 2008 R2 installations may experience a bug where print jobs are not removed from the print queue when completed. For more information please see Section 2.1.2.1, “Windows Server 2008 R2 only”. This work around will need to be performed on the clustered print server, not the nodes.

20.3.1. Mode 1 - Clustering at the Print Provider layer

20.3.1.1. Step 1 - Application Server (Primary Server) Setup

Install the *Application Server* component (**Standard Install** option) on your nominated system. This system will be responsible for providing Print-Limit Pro's web based interface and storing data. In most cases this system will not host any printers and is dedicated to the roll of hosting the Print-Limit Application Server. It may be one of the nodes in the cluster; however a separate system outside the cluster is generally recommended. An existing domain controller, member server or file server will suffice.

20.3.1.2. Step 2 - Installing the Print Provider components on each node

The *Print Provider* component needs to be separately installed on each node involved in the print spooler cluster. This is done by selecting the **Secondary Print Server** option in the installer. Follow the secondary server set up notes as detailed in Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers* . Take care to

define the correct name or IP address of the nominated application server set up in step 1.

20.3.1.3. Step 3 - Decouple service management from nodes

By default the *Print Provider* component is installed under the management of the node. To hand over management to the cluster, the service start-up type needs to be set to manual. On each node navigate to **Administrative Tools** → **Services**, locate the `Print-Limit Print Provider` service. *Stop* the service and set the start-up type to **Manual**. Repeat for each node in the cluster.

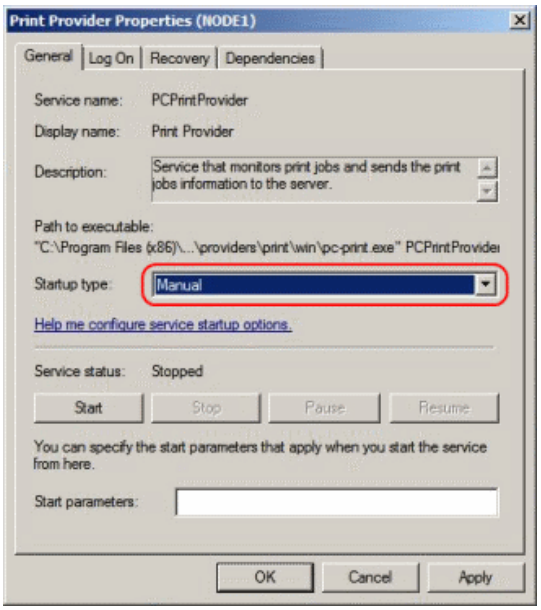


Figure 20.4. Stopping the service and setting to Manual startup

20.3.1.4. Step 4 - Adding the Print Provider service as a resource under the print spooler's cluster group

1. Open the **Failover Cluster Manager**.
2. Right-click on the cluster group hosting the spooler service and select **Add a resource** → **4 - Generic Service**.

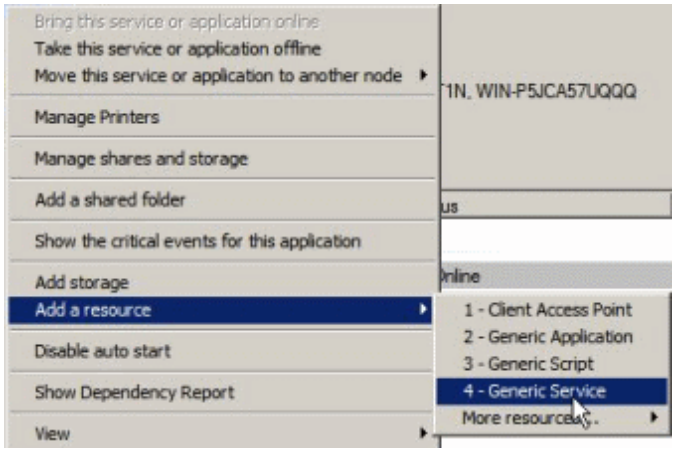

Bring this service or application online
Take this service or application offline
Move this service or application to another node
Manage Printers
Manage shares and storage
Add a shared folder
Show the critical events for this application
Add storage
Add a resource
Disable auto start
Show Dependency Report
View
1 - Client Access Point
2 - Generic Application
3 - Generic Script
4 - Generic Service
More resources...

Figure 20.5. Adding a new Generic Service Resource

3. In the new resource wizard, select the name `Print-Limit Print Provider` and click **Next**.

4. Click **Next** at **Confirmation**.
5. Click **Finish** at **Summary**.
6. Right click on the `Print-Limit Print Provider` and click **Properties**. On the **Print-Limit Print Provider Properties** page ensure the **Use Network Name for computer name** option is *checked*. Click **Ok**.

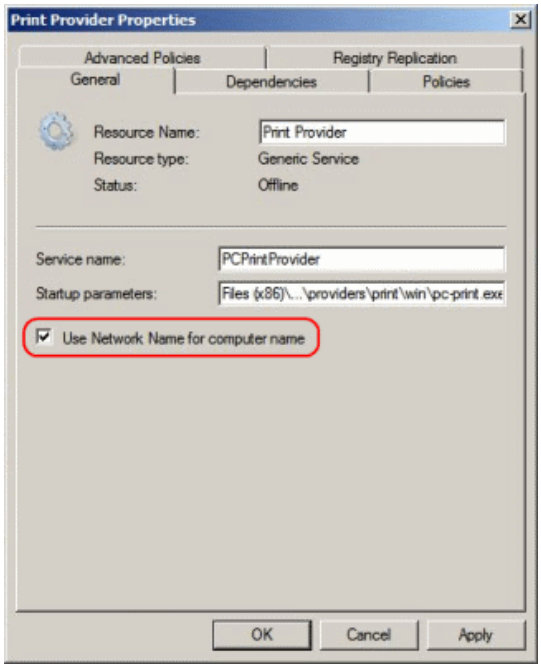


Figure 20.6. Cluster service parameters configuration

7. Right click on the `Print-Limit Print Provider` and click **Bring this resource online**.

20.3.1.5. Step 5 - Shared active job spool

To ensure the state of jobs currently active (e.g. held in a hold/release queue) are not lost during a failover event, Print-Limit Pro is able to save job state in a shared drive/directory. If a shared disk resource is available and can be added to the cluster resource, Print-Limit Pro can use this to host a shared spool directory to ensure no active job state is lost.

1. Add a shared drive to the cluster resource. e.g. (Q: drive). It is advisable to use the same drive as used for the shared print spool directory.
2. Create a directory in this drive called `Print-Limit ProSpool`
3. Create a sub-directory in `Print-Limit ProSpool` called `activejobs`
4. On *each* node, edit the file: `[app-path]/providers/print/win/print-provider.conf` and add a line pointing to the shared active job spool directory:

```
ActiveJobsSpoolDir=Q:\Print-Limit Pro\Spool\activejobs\
```

Change the drive letter as appropriate.

Important

If running an "Active-Active" print cluster you must use a separate active job spool directory for each node. To configure this use the `%service-name%` value in the `ActiveJobsSpoolDir`

setting. The `%service-name%` value is replaced by the service name of the running **Print-Limit Print Provider** instance. e.g.

```
ActiveJobsSpoolDir=Q:\Print-Limit Pro\Spool\%service-name%\activejobs\
```

5. Restart the cluster resource to ensure the change is picked up.

20.3.1.6. Step 6 - Test

Perform operations to verify that:

1. Print jobs are logged as expected.
2. No error message appear in the Print Providers text log located at: `C:\Program Files\Print-Limit Pro\providers\print\win\print-provider.log` on each node.

20.3.1.7. Active/Active Clustering - Special notes regarding multiple virtual servers

On large networks it is common to distribute load by hosting print spooler services under two or more virtual servers. For example, two virtual servers may each host half of the organization's printers and hence sharing the load. This is sometimes referred to as Active/Active clustering - all be it not an entirely correct term, as the print spooler is still running in Active/Passive.

Virtual servers cannot share the same service on any given node. For this reason if the virtual servers share nodes, you'll need to manually install the `Print-Limit Print Provider` service a second time under a different name. This can be done via the command line as follows:

```
cd C:\Program Files\Print-Limit Pro\providers\print\win
pc-print.exe PCPrintProvider2 /install
```

The argument proceeding `/install` is the unique name to assign to the service. The recommended procedure is to suffix the standard service name with a sequential number.

20.3.2. Mode 2 - Clustering at all application layers

Mode 2 implements failover clustering at all of Print-Limit Pro's Service Oriented Architecture software layers, including:

- Clustering at the Print monitoring layer
- Clustering at the Application Server layer
- Optional clustering at the database layer

Mode 2 builds upon *Mode 1* by introducing failover (Active/Passive) clustering in the *Application Server* layer. This involves having an instance of the application server on each of the cluster nodes. When one node fails, the other automatically takes over the operation. Both instances use a share data source in the form of an external database (see Chapter 18, *Deployment on an External Database (RDBMS)*). Large sites should consider using a clustered database such as Microsoft SQL Server.

This section assumes that you have an already installed and working Service and Application group hosting a clustered printing environment.

20.3.2.1. Step 1 - Application Server Installation

On one of the cluster's nodes, install the Print-Limit Application Server component by selecting the **Standard Install** option in the installer. Follow the setup wizard and complete the process of importing all users into the system.

20.3.2.2. Step 2 - Convert the system over to an external database

The system needs to be configured to use an external database as this database will be shared between both instances of the application server. Convert the system over to the required external database by following the procedure detailed in Chapter 18, *Deployment on an External Database (RDBMS)*. The database may be hosted on another system, or inside a cluster. As per the external database setup notes, reference the database server by IP address by entering the appropriate connection string in the `server.properties` file.

20.3.2.3. Step 3 - Setup of 2nd Node

Repeat steps 1 and 2 on the second and any subsequent cluster nodes.

20.3.2.4. Step 4 - Decouple service management from the nodes

By default the `Print-Limit Application Server` component is installed under the management of the node. It needs to be managed inside the cluster, so the service's start-up type should be set to manual. On each node navigate to **Administrative Tools** → **Services** locate the **Print-Limit Application Server**. Stop the service and set its start-up type to **Manual**. Repeat this on all nodes.

20.3.2.5. Step 5 - Create a new Services and Applications group

Create a new Services and Applications group containing the two nodes. Make note of the **IP Address** that you assign as it will be used later. Add the Generic Service **Print-Limit Application Server**. Give the Client Access Point an appropriate title such as `Print-LimitAppCluster`.

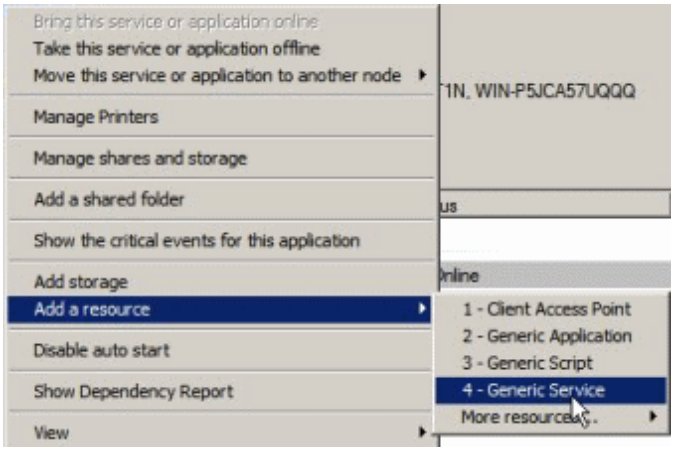


Figure 20.7. Adding a new Generic Service Resource

This Services and Applications group is separate to the existing clustered printing environment. It is recommended to set up two Services and Application groups where you can later set the node affinity to better distribute the application load across nodes.

20.3.2.6. Step 6 - Configure Print-Limit Application Server

Right click on the `Print-Limit Application Server` and click **Properties**. On the **Print-Limit Application Server Properties** page ensure the **Use Network Name for computer name** option is *checked*. On the **Dependencies** tab make sure the Service and Application group is added as a *Resource*. Click **Ok**.

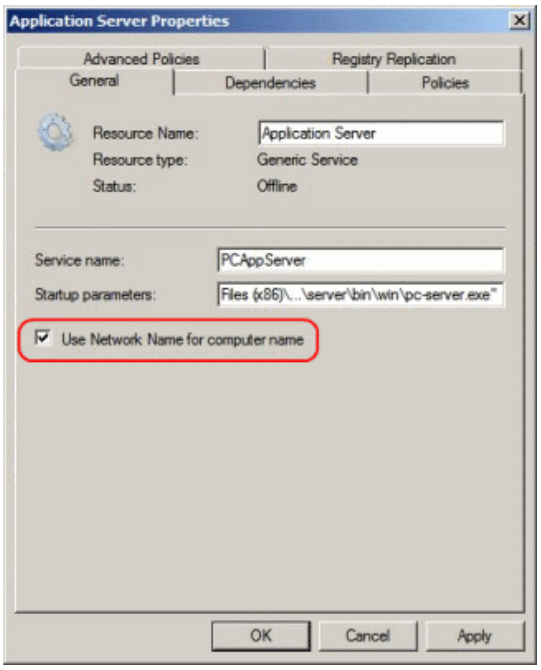


Figure 20.8. Print-Limit Application Server Properties configuration

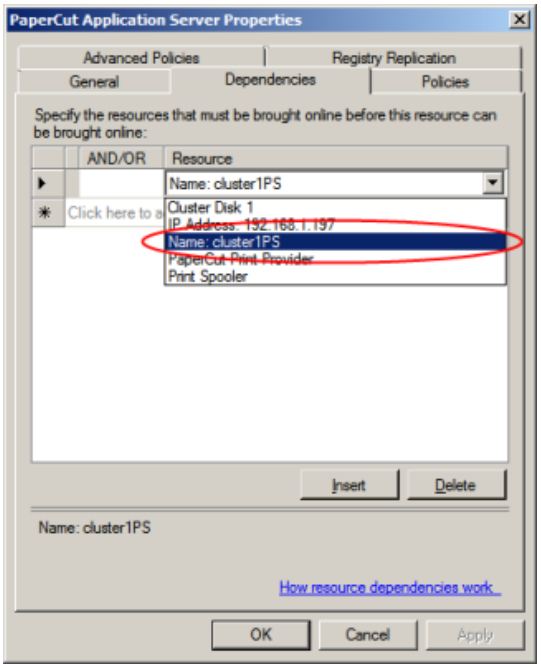


Figure 20.9. Print-Limit dependencies configuration

20.3.2.7. Step 7 - Confirm Print-Limit Application Server active

Right-click on the Service and Applications group and select Bring online. Wait until the application server has started, then verify that you can access the system by pointing a web browser to:

```
http://[Virtual Server Name]:9191/admin
```

Login, and perform some tasks such as basic user management and User/Group Synchronization to verify the system works as expected.

20.3.2.8. Step 8 - Set up the Print Provider layer

Interface the *Print-Limit Print Provider* layer with the clustered spooler service by following the same setup notes as described for *Mode 1*. The exception being that the IP address of the application server will be the IP address assigned to the Virtual Server assigned in step 5.

20.3.2.9. Step 9 - Client Configuration

The client and release station programs are located in the directories:

- `[app-path]/client/`
- `[app-path]/release/`

These directories contain configuration files that instruct the client to the whereabouts of the server. The IP address and the server name in the following set of files will need to be updated to the Virtual Server's details (Name and IP address):

- `[app-path]/client/win/config.properties`
- `[app-path]/client/linux/config.properties`
- `[app-path]/client/mac/PCClient.app/Contents/Resources/config.properties`
- `[app-path]/release/connection.properties`

Edit the files using Notepad or equivalent and repeat this for each node. Also see Section 20.6, “Client/Workstation Configuration”.

20.3.2.10. Step 10 - Test

Mode 2 setup is about as complex as it gets! Take some time to verify all is working and that Print-Limit Pro is tracking printing on all printers and all virtual servers.

20.3.2.11. Advanced: Load distribution and independent groups

Separating these resources into to groups, running on different IP addresses allows you to set up different node affinities so the two groups usually run on separate physical nodes during normal operation. This ensures the load is spread across multiple nodes.

To make this change after setting up the single group Mode 2 configuration:

1. Set the **Preferred owners** of each Services and Applications group to different physical nodes.
2. Restart or bring on line each group, and independently test operation and operation after fail-over.

20.3.3. Clustering Tips

Tip

Take some time to simulate node failure. Monitoring may stop for a few seconds while the passive server takes over the role. Simulating node failure is the best way to ensure both sides of the Active/Passive setup is configured correctly.

It is important that the version of Print-Limit Pro running on each node is identical. Ensure that any version updates are applied to all nodes so versions are kept in sync.

The Print-Limit Pro installation sets up a read-only share exposing client software to network users. If your organization is using the zero-install deployment method, the files in this share will be accessed each time a user logs onto the network. Your network may benefit from exposing the contents of this share via a clustered file share resource.

20.4. Veritas Cluster Server (VCS) on Windows

This section discusses configuring Print-Limit Pro on a Veritas Cluster Server (VCS). The section provides a brief overview and is designed to supplement guidance from the Print-Limit Pro development team. If you are about to commence a production deployment on VCS, please feel free to get in touch with the development team for further assistance if required.

Note that Mode 1 only is supported for deploying on VCS.

This section assumes that you have an already installed and working clustered printing environment.

20.4.1. Mode 1 - Clustering at the Print Provider layer

The `Print-Limit Print Provider` is the component that integrates with the `Print Spooler` service and provides information about the print events to the *Print-Limit Application Server*. At a minimum, in a cluster environment, the *Print-Limit Print Provider* component needs to be included and managed within the cluster group. The *Print-Limit Application Server* component (The **Standard installation (primary server)** option in the installer) is set up on an external server outside the cluster. Each node in the cluster is configured to report back to the single application server using XML web services over TCP/IP.

20.4.1.1. Single Virtual Server (Active/Passive)

Print-Limit Pro supports both Active/Passive and virtual Active/Active in VCS. This section discusses configurating Print-Limit Pro on a single virtual server running Active/Passive. If your organization hosts mutliple virtual servers, jump to the following section covering Active/Active.

20.4.1.1.1. Step 1 - Set up the cluster, print spooler and printers

First, set up and verify that the cluster and print server is working as expected. The system should be fully configured and tested before proceeding to the next step and installing Print-Limit Pro.

20.4.1.1.2. Step 2 - Set up the Print-Limit application server (primary server) on a system outside the cluster

Install the `Print-Limit Application Server` component (**Standard installation** option) on your nominated system. This system will be responsible for providing Print-Limit Pro's web based interface and storing data. In most cases this system will not host any printers and is dedicated to the role of hosting the *Print-Limit Application Server*. It may be one of the nodes in the cluster; however a separate system outside the cluster is generally recommended. An existing domain controller, member server or file server will suffice.

20.4.1.1.3. Step 3 - Install Print-Limit Print Provider on both nodes

The *Print Provider* component needs to be installed separately on each node involved in the print spooler cluster. This is done by selecting the Secondary Print Server option in the installer. Follow the secondary server set up notes as detailed in Chapter 14, *Configuring Secondary Print Servers and Locally Attached Printers*. Take care to define the correct name or IP address of the nominated application server set up in step 1.

20.4.1.1.4. Step 4 - Configure the Print-Limit Print Provider Service to bind to the virtual server

By default the Print-Limit Print Provider component will associate itself with the physical node. A configuration change is required to force it to bind to the virtual server. Add the following lines (or uncomment the example lines) to the file: `C:\Program Files\Print-Limit Pro\providers\print\win\print-provider.conf`

```
ServerName=[VIRTUAL SERVER NAME]
PrintServerName=\\[VIRTUAL SERVER NAME]
```

Where `[VIRTUAL SERVER NAME]` is the network name associated with your virtual server. Note that the `PrintServerName` must be prefixed with two back-slashes (`\\`). The first setting is used to override the name reported to the *Print-Limit Pro Application Server*. The `PrintServerName` setting instructs the print provider to search for printers on the virtual server rather than on the physical server.

20.4.1.1.5. Step 5 - Decouple service management from nodes

By default the *Print Provider* component is installed under the management of the node. To hand over management to the cluster, the service start-up type needs to be set to manual. On each node navigate to **Control Panel** → **Administrative Tools** → **Services** and locate the `Print-Limit Print Provider` service. *Stop* the service and set the start-up type to **Manual**. Repeat for each node in the cluster.

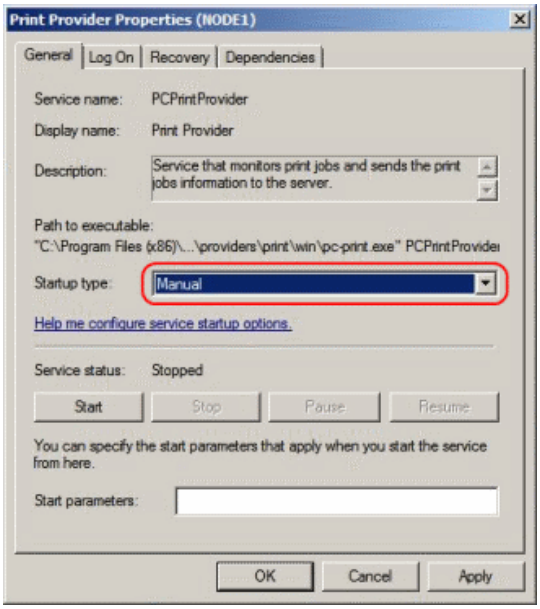


Figure 20.10. Stopping the service and setting to Manual startup

20.4.1.1.6. Step 6 - Add the Print-Limit Print Provider Service as a Generic Service

The *Print-Limit Print Provider* service needs to be added to the Veritas Cluster group associated with the virtual server. This is to ensure that the service is managed within the same group as the print server and will fail-over as part of the group. Create a new **GenericServer** resource called `Print-LimitPrintProvider01`. Set the service name to `PCPrintProvider`. The account, password and domain can be left as defaults.

20.4.1.1.7. Step 7 - Set up dependencies

The `PCPrintProvider` service must start after the print spool resource. Create a dependency link between `Print-LimitPrintProvider01` and the `PrintSpooler` using the tools on the Veritas Cluster Resources tab associated with this virtual server.

20.4.1.1.8. Step 8 - Test

Take some time to test and ensure printing is monitored as expected. Use the Veritas Cluster administration console to simulate node failure and ensure monitoring continues after failure.

20.4.1.2. Multiple Virtual Servers (Active/Active)

On large networks it is common to distribute load by hosting print spooler services under two or more virtual servers. For example, two virtual servers may each host half of the organization's printers and hence share the load. This is sometimes referred to as Active/Active clustering - albeit not an entirely correct term, as the print spooler is still running in Active/Passive.

Virtual servers cannot share the same service on any given node. For this reason if the virtual servers share nodes, you'll need to manually install the `Print-Limit Print Provider` service a second time under a different name. Use the following procedure.

20.4.1.2.1. Step 1 - Set up one Virtual Server

Set up one virtual server using all steps in the preceding section. After this virtual server is tested, perform the steps below to set up the 2nd virtual server.

20.4.1.2.2. Step 2 - Create a 2nd instance of the Print-Limit Print Provider on each physical node

A 2nd copy of the *Print-Limit Print Provider* needs to be created on each physical node. This is required so that a separate service can be installed and configured to bind to the 2nd virtual server. Copy the following directory, and all its contents: `C:\Program Files\Print-Limit Pro\providers\print` to `C:\Program Files\Print-Limit Pro\providers\print2`. Repeat this step on both physical nodes.

20.4.1.2.3. Step 3 - Configure the copied instance to bind to the 2nd virtual server

Add the following lines (or uncomment the example lines) to the file at `C:\Program Files\Print-Limit Pro\providers\print\win\print-provider.conf`:

```
ServerName=[VIRTUAL SERVER NAME 2]
PrintServerName=\\[VIRTUAL SERVER NAME 2]
```

Where `[VIRTUAL SERVER NAME 2]` is the network name associated with your *2nd* virtual server. Note that the `PrintServerName` must be prefixed with two back-slashes (`\\`).

Repeat this step on both physical nodes.

20.4.1.2.4. Step 4 - Manually install the a 2nd instance of the PCPrintProvider service

Services need a unique name. We'll install a 2nd instance of the service under the name `PCPrintProvider2`. This is done by typing the following commands at the command prompt.

```
cd C:\Program Files\Print-Limit Pro\providers\print2\win
pc-print.exe PCPrintProvider2 /install
```

Repeat this step on both physical nodes.

20.4.1.2.5. Step 5 - Add this service to the resource group associated with the 2nd virtual server

Repeat steps 5 through 8 in the preceding section, this time using the service name `PCPrintProvider2` rather than `PCPrintProvider`. The recommend unique name for the cluster resource in step 6 is `Print-LimitPrintProvider01`.

20.5. Novell Cluster Services (NCS) on Novell OES Linux

This section assumes that you have an already installed and working clustered printing environment.

20.5.1. Mode 1 - Clustering at the print provider layer

20.5.1.1. Step 1 - Application Server (Primary Server) Setup

Before installing a secondary server/clustered print provider you should take some time to ensure the primary Print-Limit server (central Application Server) is set up and running correctly. The primary server will be responsible for providing Print-Limit Pro's web based interface and storing data. In most cases where a cluster is involved the primary server will not host any printers and is dedicated to the role of hosting the Print-Limit Application Server. If it is not running fine now, adding an extra server will only "add an extra variable to the equation" and complicate troubleshooting. Take some time now to verify that the primary server is functioning correctly. For example, verify

that:

- Install and configuration is completed
- Administrators can access the system via a web browser for administration.
- Users can log into the user web interface from their workstations.

20.5.1.2. Step 2 - Ensure firewall allows access to port 9191

Cluster nodes needs to communicate (initiate a TCP connection) with the primary Print-Limit server on port 9191. Administrators should ensure that any firewall software on the primary application server is not set to block any incoming local network traffic on this port. A good way to test is to open a browser on the planned cluster nodes and confirm you can access the administration web interface on port 9191.

20.5.1.3. Step 3 - Create eDirectory user account

The `printlimit` user's home directory denotes the application install location. For the fact that it is the default for LUM enabled users, `/home/printlimit` is recommended, and assumed through the rest of this guide.

1. In iManager open **Users** → **Create User**.
2. For **username**, enter `printlimit`.
3. For **Last name** enter `Print-Limit LUM user`.
4. For **context** choose the same eDirectory context as your the iPrint user and iprintgrp group created during your clustered iPrint installation.
5. Assign the user a secret password during creation, and ensure the user's password is set to not expire. This may require associating the user with an appropriate password policy after creation if you are using eDirectory password policies.
6. Click the tickbox next to **Create home directory**.
7. For **Volume** choose the volume that is holding your clustered iPrint resource.
8. For **Path** ensure that it reads `printlimit`.
9. Click **OK** to create the user.

We now need to LUM enable this Print-Limit eDirectory user and add it to the already LUM enabled `iprintgrp` used by the clustered iPrint resource.

1. In iManager open **Linux User Management** → **Enable Users for Linux**.
2. Select your printlimit eDirectory user and continue.
3. Select **An Existing Linux-Enabled Group** and choose the `iprintgrp` created during your clustered iPrint installation and press **Next**.
4. Confirm that **Workstation list** includes all of the servers in your cluster and press next.
5. On your clustered iPrint volume, navigate to the `printlimit` user's NSS home folder (`/media/nss/[volume]/printlimit`) using for example Windows Explorer or ConsoleOne and add `RWECMF` file rights for the eDirectory group `iprintgrp` created during your clustered iPrint installation. This ensures the iPrint services have access to the installed files.
6. As `root`, on *each* node that will run the iPrint resource, run the following command, replacing `[volume]` with the volume name of your iPrint resource.

   ```
   shell> ln -s /media/nss/[volume]/printlimit /home/printlimit
   ```

   Note: The symlink target will only exist on the active node and will "dangle" on the other nodes ready for when it becomes the active node.
7. To confirm all the above stages are working, using any method you like (such as the traditional Novell client for

Windows, logged in as an admin user), create a folder or test files inside the printlimit folder on your iPrint cluster volume, then on the server holding that resource run:

```
shell> su - printlimit
shell> ls
```

You should be able to see the files created on the NSS volume. They should also be able to be viewed via `/home/printlimit` on the *active* node.

20.5.1.4. Step 4 - Install the Print Provider

Important

The instructions below assume i686 architecture. If your system OS is 64-bit, replace i686 with x64 in all file paths.

Install the print provider software onto the secondary server by copying all files and directories from the primary application server's directory:

```
[app-path]/providers/print/linux-i686/*
```

to the equivalent location on the node currently holding the iPrint resource:

```
/home/printlimit/providers/print/linux-i686/
```

Perform the copy operation as the `printlimit` user so that files are owned by the `printlimit` user. You may use any method to copy the files, including over the network or via a USB key. If the primary server is also Linux, the simplest way would be use secure copy (`scp`) as follows:

```
shell> su - printlimit
shell> mkdir -p providers/print
shell> cd providers/print
shell> scp -r primary.server.name:/home/printlimit/providers/print/* .
```

After the copy operation is performed, execute the `setperms` and `roottasks` scripts as root:

```
shell> su - root
shell> sh ~printlimit/providers/print/linux-i686/setperms
shell> sh ~printlimit/providers/print/linux-i686/roottasks
```

20.5.1.5. Step 5 - Configuration

The print provider on the cluster needs to know where the primary server is installed (i.e. its IP address). It also needs to correctly report the cluster name to the primary server.

1. Open the file `/home/printlimit/providers/print/linux-i686/print-provider.conf` in a text editor.

2. Locate the line starting with `ApplicationServer=` and change `127.0.0.1` to the hostname or IP address of the primary server.
3. Locate the line starting with `ServerName=`, uncomment it and add the hostname of the cluster. This tells Print-Limit Pro to report printers as being hosted on the cluster rather than on the node running the resource.

20.5.1.6. Step 6 - Cluster Configuration

1. **Configuring services**

   As the services are going to be managed by Novell clustering, the services on the physical nodes must be disabled so that they don't start. On the node used to install Print-Limit in Section 20.5.1.4, “Step 4 - Install the Print Provider”, in **YaST** → **System** → **System Services (Runlevel)**, disable `printlimit-event-monitor`.

2. **Installing services and disabling them on all other nodes**

   On each other node in the cluster perform the following steps:

   a. As `root` run the following command ([resource-name] is the name for your iPrint resource, and [node-name] is the server name of the node you are now working on):

   ```
   shell> cluster migrate [resource-name] [node-name]
   ```

   b. Once the resource has successfully migrated run the following command (still as root):

   ```
   shell> /home/printlimit/providers/print/linux-[arch]/roottasks
   shell> chown root:iprintgrp /opt/novell/iprint/bin/printlimit
   ```

   c. In **YaST** → **System** → **System Services (Runlevel)**, disable `printlimit-event-monitor`.

   d. Repeat steps 1-3 on the other nodes in the cluster.

The binaries copied in Section 20.5.1.4, “Step 4 - Install the Print Provider” now need to be integrated into Novell iPrint by adding printlimit as the **Accounting Autoload Command** as discussed in Section 2.3.5, “Step 5 - Printer/iPrint Configuration” under Section 2.3, “Installation on Novell OES Linux (iPrint)”. Follow that step only and return here once completed.

20.5.1.7. Step 7 - Test

Mode 1 clustering should now be configured. Perform some test printing on all of this secondary server's printers. Log into the Print-Limit admin interface as `admin` and verify that the printers are now listed under the **Printers** tab. Simulate a node failover and test again (wait a minute or two between failures for the new node to engage).

20.5.2. Mode 2 - Clustering at all application layers

This section assumes that you have an already installed and working clustered printing environment.

20.5.2.1. Step 1 - Prerequisites

This guide assumes you have iPrint up and working within an existing cluster. It is assumed the cluster is set up following Novell's documentation at http://www.novell.com/documentation/oes2/iprint_lx/?page=/documentation/oes2/iprint_lx/data/akujhhq.html.

Ensure the size of the shared disk partition and NSS Pools are sufficient for your print manager, driver store, and Print-Limit installation. This may mean making it larger than Novell's recommended 20GB if you are intending to use the internal database and store large amounts of data over time.

20.5.2.2. Step 2 – Create eDirectory user account

The `printlimit` user's home directory denotes the application install location. For the fact that it is the default for LUM enabled users, `/home/printlimit` is recommended, and assumed through the rest of this guide.

1. In iManager open **Users** → **Create User**.
2. For **username**, enter `printlimit`.
3. For **Last name** enter `Print-Limit LUM user`.
4. For **context** choose the same eDirectory context as your the iPrint user and iprintgrp group created during your clustered iPrint installation.
5. Assign the user a secret password during creation, and ensure the user's password is set to not expire. This may require associating the user with an appropriate password policy after creation if you are using eDirectory password policies.
6. Click the tickbox next to **Create home directory**.
7. For **Volume** choose the volume that is holding your clustered iPrint resource.
8. For **Path** ensure that it reads `printlimit`.
9. Click **OK** to create the user.

We now need to LUM enable this Print-Limit eDirectory user and add it to the already LUM enabled `iprintgrp` used by the clustered iPrint resource.

1. In iManager open **Linux User Management** → **Enable Users for Linux**.
2. Select your printlimit eDirectory user and continue.
3. Select **An Existing Linux-Enabled Group** and choose the `iprintgrp` created during your clustered iPrint installation and press **Next**.
4. Confirm that **Workstation list** includes all of the servers in your cluster and press next.
5. On your clustered iPrint volume, navigate to the `printlimit` user's NSS home folder (`/media/nss/[volume]/printlimit`) using for example Windows Explorer or ConsoleOne and add `RWECMF` file rights for the eDirectory group `iprintgrp` created during your clustered iPrint installation. This ensures the iPrint services have access to the installed files.
6. As `root`, on *each* node that will run the iPrint resource, run the following command, replacing `[volume]` with the volume name of your iPrint resource.

   ```
   shell> ln -s /media/nss/[volume]/printlimit /home/printlimit
   ```

   Note: The symlink target will only exist on the active node and will "dangle" on the other nodes ready for when it becomes the active node.
7. To confirm all the above stages are working, using any method you like (such as the traditional Novell client for Windows, logged in as an admin user), create a folder or test files inside the printlimit folder on your iPrint cluster volume, then on the server holding that resource run:

   ```
   shell> su - printlimit
   shell> ls
   ```

   You should be able to see the files created on the NSS volume.

20.5.2.3. Downloading and installing

On the node that is currently hosting the iPrint resource, perform a primary server Print-Limit installation as per steps 3 and 4 in Section 2.3, “Installation on Novell OES Linux (iPrint)”.

Important

Ensure this only done on the node that is currently holding the iPrint/Print-Limit resource.

20.5.2.4. Step 4 - Installing services

1. As the services are going to be managed by Novell clustering, the services on the physical nodes must be disabled so that they don't start. On the node used to install Print-Limit in Section 20.5.1.4, “Step 4 - Install the Print Provider”, in **YaST** → **System** → **System Services (Runlevel)**, disable both `printlimit` and `printlimit-event-monitor`.
2. **Installing services and disabling them on all other nodes**

   On each other node in the cluster perform the following steps:

   a. As `root` run the following command ([resource-name] is the name for your iPrint resource, and [node-name] is the server name of the node you are now working on):

   ```
   shell> cluster migrate [resource-name] [node-name]
   ```

   b. Once the resource has successfully migrated run the following two commands (still as root):

   ```
   shell> /home/printlimit/server/bin/linux-[arch]/roottasks
   shell> /home/printlimit/providers/print/linux-[arch]/roottasks
   shell> chown root:iprintgrp /opt/novell/iprint/bin/printlimit
   ```

   c. In **YaST** → **System** → **System Services (Runlevel)**, disable both `printlimit` and `printlimit-event-monitor`.

   d. Repeat steps 1-3 on the other nodes in the cluster.

20.5.2.5. Step 5 - File permissions

On each node in the cluster, *including* the one used to install Print-Limit in Section 20.5.2.3, “Downloading and installing”, run the following command as `root`:

```
shell> chown root:iprintgrp /opt/novell/iprint/bin/printlimit
```

20.5.2.6. Step 6 - Configure the nodes to report the virtual server hostname

Note

This step only has to be completed on whichever node is currently holding the iPrint resource, as the print provider config file is on the portable volume and will automatically be picked up when the resource moves.

1. Open the file `/home/printlimit/providers/print/linux-i686/print-provider.conf` in a text editor.
2. Locate the line starting with `ServerName=`, uncomment it and add the hostname of the cluster. This tells Print-Limit Pro to report printers as being hosted on the cluster rather than on the node running the resource.

20.5.2.7. Step 7 – Update iPrint cluster resource scripts to load/unload the Print-Limit application server

1. In **iManager** → **Clusters** → **Cluster Options** open the cluster hosting your iPrint resource.
2. Click on the iPrint resource, then **Scripts**.
3. This screen displays the load script, which should something like the following:

```
#!/bin/bash
. /opt/novell/ncs/lib/ncsfuncs
exit_on_error nss /poolact=IPRINT
exit_on_error ncpcon mount IPRINT=250
exit_on_error add_secondary_ipaddress 10.10.55.7
exit_on_error ncpcon bind --ncpservername=FPCL_IPRINT_SERVER --ipaddress=10.10.55.7
ignore_error mv /media/nss/IPRINT/var/opt/novell/iprint/iprintgw.lpr /media/nss/IPRINT/var/o
exit_on_error rcnovell-idsd start
exit_on_error rcnovell-ipsmd start
exit 0
```

4. Add the following line between `exit_on_error rcnovell-ipsmd start` and `exit 0`:

```
exit_on_error /etc/init.d/printlimit start
exit_on_error /etc/init.d/printlimit-event-monitor start
```

5. Click **Apply**, then **Unload Script**. The unload script should look something like the following:

```
#!/bin/bash
. /opt/novell/ncs/lib/ncsfuncs
ignore_error rcnovell-ipsmd stop
ignore_error rcnovell-idsd stop
ignore_error ncpcon unbind --ncpservername=FPCL_IPRINT_SERVER --ipaddress=10.10.55.7
ignore_error del_secondary_ipaddress 10.10.55.7
ignore_error nss /pooldeact=IPRINT
exit 0
```

6. Insert the following two lines between `. /opt/novell/ncs/lib/ncsfuncs` and `ignore_error rcnovell-ipsmd stop`:

```
ignore_error /etc/init.d/printlimit-event-monitor stop
ignore_error /etc/init.d/printlimit stop
```

7. Click **Apply**, then offline and online the iPrint resource to load it with these new scripts.

20.5.2.8. Step 8 - Config files

When installing Print-Limit in step Section 20.5.2.3, “Downloading and installing” the IP address of the physical node will have been automatically detected and stored in config files to simplify the deployment of remote components. These config files will require modification so that the components connect to the cluster / virtual server resource instead.

Update the server IP address and hostname to the cluster / virtual server resource in the following configuration files:

- /home/printlimit/client/win/client.properties
- /home/printlimit/client/mac/PCClient.app/Contents/Resources/config
- /home/printlimit/release/connection.properties

- client-config.js in each Gadget in /home/printlimit/client/win/
- /home/printlimit/client/mac/Widget/PCWidget/config
- /providers/net/connection.properties
- /providers/hardware/ricoh/*/connection.properties

As these config files are all on the shared resource they only need to be changed once on the node currently hosting the resource.

20.5.2.9. Step 9 - Printer / iPrint configuration

Each printer in the cluster that will be managed/tracked by Print-Limit needs further configuration via iManager. Follow Section 2.3.5, “Step 5 - Printer/iPrint Configuration” under Section 2.3, “Installation on Novell OES Linux (iPrint)” and return here once completed.

20.5.2.10. Step 10 – Test

Mode 2 clustering should now be configured. Perform some test printing on all of this secondary server's printers. Log into the Print-Limit admin interface as `admin` and verify that the printers are now listed under the **Printers** tab. Simulate a node failover and test again (wait a minute or two between failures for the new node to engage).

20.5.2.11. Step 11 – Sharing Client Software

As the clustered solution uses NSS, the client folder is already available as an NCP share at `\\[cluster-virtual-server]\[volume-name]\printlimit\client`. Users should be able to access this folder once they are given file rights. Alternatively, consider making these files available via an alternate share/path/location.

20.6. Client/Workstation Configuration

In a clustered environment the behavior of Print-Limit Pro on the workstations is identical to that of a non-clustered environment. The one exception however is in terms of configuration - The clients need to be configured to connect to the *Virtual Server* rather that directly connecting to a node (i.e. network connections need to be made via virtual server's designated IP address). The changes necessary are:

1. Update User Client's configuration file `config.properties` with the Virtual Server's details as per Section 20.2.2.9, “Step 9 - Client Configuration”.
2. Ensure that any URL's pointing to Print-Limit Pro's web administration and user interfaces; `http://[server]:9192/admin` and `http://[server]:9192/user` user the virtual server's name. For example, any links on the organization's intranet site or links supplied to other system administrators.

Chapter 21. Print-Limit Pro on Linux

This section is designed to supplement the Install Guide (see Section 2.4, “Installation on Linux (CUPS and/or Samba)”). It provides an in-depth explanation of the Linux installation process, the directory layout and tools.

Information in this chapter is technical in nature. It is expected that readers have prior experience with:

- The Unix command line environment
- Unix file permissions
- Configuring CUPS and/or Linux print queues
- Or basic Samba configuration

21.1. The Installation Process

The Linux version of Print-Limit Pro is supplied as a pre-compiled self-installing application. The installation process is designed to work with all major Linux distributions. Due to the varied nature of some installations and administrator preferences, often some manual configuration is required. This section describes the installation process in detail as well as some additional options available to system administrators.

21.1.1. Manual extraction

The Linux version of Print-Limit Pro is supplied in a self-extracting, self-installing archive. The archive is simply a `tar` archive compressed with `gzip`, and headed with a shell script to facilitate self-extracting. After extraction is complete, the installation script named `install` is executed to begin the install process. Some system administrators may like to inspect the contents of the archive, and possibly the installation process itself prior to the actual install. The self-extracting installer takes a number of command line arguments. The `-e` argument will extract the archive into the current working directory ready for inspection. Further options and documentation is available via the `--help` option.

```
Usage: plp-setup.sh [-e|-i|-l] [-v] [-n] [list ...]
   -e      Extract the files and then exit without installing.
   -i      Install after extracting the files (default).
   -l      List the contents of the archive and exit without
           extracting.
   -v      Verbose. Print the names of the files as they are
           extracted.
   list    The list of files to extract."
```

21.1.2. The install process

Even though the majority of the installation process is completed under the identity of the non-privileged user account called `printlimit`, most administrators would like to know what the install process does. The main steps are outlined below:

21.1.2.1. Extraction

The first stage in the install process extracts the archive to `/tmp` or a location as defined by an environment variable `TMPDIR`. The command-line programs `tar` and `gunzip` are used during this phase.

21.1.2.2. Installation

After extraction is complete the installation script is called. The install script, called `install`, will present the EULA and request acceptance. The script then determines the install location. This is the `printlimit` user's home directory. The home directory is determined by the `HOME` environment variable, or if not set, the result of a call to `getpwnam()`.

Files are then copied into the `printlimit` user's home directory. Care is taken not to overwrite any existing data or configuration files if this is an install-over-the-top upgrade.

21.1.2.3. Permissions

To ensure the default installation is secure by default, permissions are applied to key files. The following area of the application are restricted to the `printlimit` user only:

Area	Comments
`~/server/server.properties`	Contains server configuration including the default admin password.
`~/server/data`	This directory contains application data including database files. Some of this data may contain sensitive information.
`~/server/bin/linux-[x64|i686]`	This directory contains a setuid-root binary. Even though the binary is no use to an end-user or hacker, good security practice stipulates that we should only allow the `printlimit` user access to this directory.

Table 21.1. Secured Application Areas

Permissions can be checked and re-applied at any time post-install by running the scripts:

```
~/server/bin/linux-*/setperms
~/providers/print/linux-*/setperms
```

21.1.2.4. Firewall

The Print-Limit Pro *Application Server* (`pc-app` process) listens on port 9191. This port is used for browser based administration access, for client access, and other services. Ensure that any firewall or local IP filtering software such as `iptables` is set to allow local network traffic access to this port.

21.1.2.5. Root Level Tasks

A small part of the install process needs to run as the `root` account. The tasks conducted as root include:

- Setting the `authpam` binary as setuid-root. This binary is used for password verification.
- Installing a CUPS backend. This is done by placing a symlink in the CUPS lib/backend directory.
- Setting up SYSV style start scripts if the system uses this boot process. This is done by placing symlinks in the:

```
/etc/init.d/
/etc/rc3.d/
/etc/rc5.d/
and so on...
```

If the administrator decides not to run the root-level tasks during the install process, the tasks can be run again post-install by executing the shell scripts:

```
~/server/bin/linux-*/roottasks
~/providers/print/linux-*/roottasks
```

Alternatively the administrator can view the scripts and make the required changes by hand.

21.1.3. Linux Print Queue Integration

Print-Limit Pro is able to integrate with and monitor CUPS, Samba and Novell iPrint based print queues. The configuration and an explanation of the integration methods follows:

21.1.3.1. CUPS Configuration Overview

If the print queues are managed and controlled via CUPS, the Device URI on each printer should be modified so the `printlimit` backend is incorporated into the print process. This can be done automatically by running the `configure-cups` script as `root` (the simplest option):

```
~/providers/print/linux-*/configure-cups
```

and following the interactive instructions. Alternatively, it can be done manually via the CUPS web admin interface or by editing the CUPS `printers.conf` file:

1. Open `printers.conf` (e.g. `/etc/cups/printers.conf`)
2. Prefix the DeviceURL for each printers with "`printlimit:`". For example:

   ```
   DeviceURI socket://192.168.1.200:9100
   ```

   Would become:

   ```
   DeviceURI printlimit:socket://192.168.1.200:9100
   ```

3. Restart `cupsd` so the new configuration is detected (e.g. `/etc/init.d/cupsd reload`)

21.1.3.2. CUPS Integration Explained

CUPS, the Common UNIX Printing System, is a popular system for managing printers on Linux servers. CUPS uses a chain-of-commands concept where `filters` and `backends` combine together to form a process steam - a workflow. Print-Limit Pro hooks into this workflow at the backend level, intercepting the job before it's passed on to physical printer hardware.

The interception is done by wrapping or proxying the real CUPS `backend`. CUPS calls the Print-Limit Pro backend which processes the job. If the job is approved, it passes the document onto the real backend. If the job is denied, it is deleted and proceeds no further. The Print-Limit Pro backend is usually set up and installed by default during the standard installation.

Setting up the Print-Limit Pro CUPS backend proxy is a relatively simple task. All the administrator needs to do is prefix the existing `DeviceURI` with `printlimit:`. For example the entry:

```
DeviceURI socket://192.168.1.200:9100
```

would become:

```
DeviceURI printlimit:socket://192.168.1.200:9100
```

The printer will register itself with Print-Limit Pro on the first print event.

21.1.3.2.1. Print-Limit Pro CUPS Architecture

The Print-Limit Pro CUPS backend is a native compiled binary. In Print-Limit Pro documentation it is referred to it as a *Print Provider* - a component that provides print event information to the *Application Server*. It's responsible for

analyzing the print job and then communicating this information to the *Application Server* component. Communication is via an XML-RPC based Web Services call. This means that the backend does not even need to be on the same server as the system hosting the Application Server component.

21.1.3.3. Samba Configuration Overview

If the print queues are exposed to network workstations using Samba *(Samba Website)* [http://www.samba.org/], and a print system other than CUPS is used (e.g. BSD, LPRNG, SYSV, etc.) the `smb.conf` needs some additional configuration. The "`print command`" needs to be replaced with a Print-Limit Pro command.

1. Open the `smb.conf` (e.g. `/etc/samba/smb.conf`)
2. Under the `[global]` section insert the line:

```
print command=/home/printlimit/providers/print/linux-i686/samba-print-provider
    -u "%u" -J "%J" -h "%h" -m "%m" -p "%p" -s "%s"
    -a "[standard print command]" &
```

(IMPORTANT: The above information should appear all on a single line. Note the use of the & (ampersand) on the end of the line.)

where `[standard print command]` is the command that would normally called for printing. Typical examples of commands usually used for printer are listed below:

Type	Command
BSD, AIX, QNX, LPRNG or PLP	`lpr -r -P%p %s`
SYSV or HPUX	`lp -c -d%p %s; rm %s`

Table 21.2. Standard print commands

More information on standard print commands is available under the Samba documentation installed on your system (see `man smb.conf`).

21.1.3.4. Samba Integration Explained

Samba is used to provide file and print sharing to Windows systems and is a popular solution. One of the main reasons for its popularity is that it avoids the need for expensive Microsoft Windows server licenses!

Samba exposes the locally set up Linux/Unix printers as network shared Windows printers. It does this by wrapping the underlying print system - usually CUPS or LPR/LPD. In the case of LPR, Samba calls the standard `lp` command line programs to perform printing. Print-Limit Pro works by wrapping or proxying the "`print command`". More information on how Samba interacts with the underlying print system is available in the Samba documentation.

A typical entry in the Samba configuration file `smb.conf` defining the Print-Limit Pro print command wrapper would be:

```
print command=/home/printlimit/providers/print/linux-i686/samba-print-provider
   -u "%u" -J "%J" -h "%h" -m "%m" -p "%p" -s "%s"
   -a "[standard print command]" &

(IMPORTANT: The above information should appear all on the one line.
Note the use of the & (ampersand) on the end of the line.)
```

where `[standard print command]` is the command that would normally be called for printing.

The %u, %p, etc., are Samba substitution variables. These are replaced with content such as the username, printer name, etc. and are used by Print-Limit Pro in the reporting and logging.

The printer will register itself with the Print-Limit Pro web interface after the first print is received.

21.1.3.4.1. Print-Limit Pro Samba Architecture

The Print-Limit Pro Samba print command wrapper is a native compiled executable. The Print-Limit Pro documentation refers to it as a *Print Provider*. It's responsible for analyzing the print job and then communicating this information to the *Application Server* component. Communication is via an XML-RPC based Web Services call. This means that the command does not even need to be on the same server as the system hosting the Application Server component.

21.1.3.5. Novell iPrint Configuration

Print-Limit Pro works by directly integrating with the Novell iPrint Print Manager. The configuration process is detailed in Section 2.3.5, “Step 5 - Printer/iPrint Configuration”. The development team at Netop has worked with the Novell iPrint engineers during 2008 to ensure an iPrint API was available that allow iPrint users to have access to the same feature set as seen on Windows, Mac and Linux CUPS. Print-Limit Pro uses this API set to intercept and account for jobs as they pass into the iPrint queue.

21.2. Advanced Configuration & Logs

The majority of Print-Limit Pro configuration is conducted in the *Application Server*'s web interface. Some additional configuration options are available in the following configuration files:

Config File	Comments
`~/server/server.properties`	Contains server configuration including the default admin password, the server's TCP port and external database connection parameters.
`~/providers/print/linux-[x64|i686]/print-provider.conf`	The *Print Provider*'s configuration file used by both the Samba and CUPS Print Providers. This file defines items such as the *Application Server*'s IP address and port, process timeouts and other.

Table 21.3. Advanced Configuration

Most important application logging is available via the **Application Log** section of the *Application Server*'s web interface. Some additional advanced level logging is maintained in standard text files located at:

```
~/server/logs/*
~/providers/print/linux-[x64|i686]/print-provider.log
```

Administrators may wish to consult these logs when attempting to diagnose or troubleshoot problems.

21.3. Backups & System Management

Suggested backup procedures are detailed in Section 12.5, “System Backups”. Common system management functions are covered in Chapter 12, *System Management*.

Administrators managing Linux servers should also consider adopting the following management policies:

- Regularly check for Print-Limit Pro updates. Updates can be applied with a simple, *install-over-the-top* procedure.
- Remember to add the Print-Limit Pro backend or command when configuring new printers.
- Always check Print-Limit Pro's functionality after a system updates (i.e. new versions of CUPS or Samba, or configuration changes).

21.4. User Directory and Authentication

Print-Limit Pro synchronizes its user directory with the underlying operating system or network. The Linux version of Print-Limit Pro ships with two user directory implementations. Due to the nature of Linux, some organizations may

have customized user directory implementations. Print-Limit Pro can support customization in this area. This section details the user/group/authentication options available as standard, as well has how one would go about developing customized implementation.

21.4.1. Standard Unix

The **Standard Unix** user directory provider uses standard Unix API's to enumerate user and group information. This allows group information to be defined on either the local system or via another source as configured via `nsswitch.conf`. For example, the system may be configured via `nsswitch.conf` to obtain user directory information from a centralized LDAP server or Novell's eDirectory.

User password authentication is performed via PAM. (Note: For administrators wishing to customize the PAM authentication method at the application level, Print-Limit Pro reports itself as "printlimit".)

21.4.2. Samba/Windows Domain

If the user and group information is provided by a Windows Domain such as an NT Style Domain or Active Directory, the **Samba** option is most appropriate. This option would normally be used on networks where the printers are hosted on a Linux server and exposed to Windows users via Samba.

At the technical level, the Samba support is implemented as a set of Perl script wrappers around standard Samba commands such as `net` and `smbclient`. Administrators should ensure these Samba commands are on the `printlimit` user's path.

21.4.3. Custom

Some large networks, particularly those found at established universities, may have custom user directory and authentication services not directly supported by Print-Limit Pro. To support these networks, administrators can use scripting and other technologies to build a new custom *User Directory Information Provider*.

Print-Limit Pro works by handing off user, group and user authentication tasks to a separate program/process. The external process must accept a set of commands as command-line arguments and return the answer in a tab delimited prescribed format on standard out. More information on the format can be found in Section 15.8, “Custom User Directory Information Providers”. The source code for the standard Print-Limit Pro supplied *User Directory Information Provider* are also supplied as part of the installation, and these may prove to be a good example. The source code is provided in:

```
~/server/bin/linux-[x64|i686]/src/
~/server/bin/linux-[x64|i686]/sambauserdir
~/server/bin/linux-[x64|i686]/authsamba
```

21.5. Unix Command-Line Release Station Client

In a modern Linux environment, the most commonly used print system is usually CUPS. Print-Limit Pro can be configured to integrate with CUPS to conveniently track printing. On Legacy Unix systems CUPS is often not an option and printing is performed via the Line Printer tools such as `lp` or `lpr`. LPR/LPD is a non-authenticated printing protocol so the identity of the user associated with a print job can't be trusted. Instead, the authentication must be performed at the Print-Limit Pro application layer. The Print-Limit Pro client tool with popup authentication as discussed at Section 23.2.2, “Scenario Two: The Multi-User Mac with Popup Authentication” is a good option but not appropriate for a terminal-only environment. Terminal-only environments can be supported via a release station queue (see Chapter 10, *Hold/Release Queues & Print Release Stations* for more detail). Jobs held in a release station queue are normally accessed and released via a dedicated terminal or a web browser based interface, however for the benefit of terminal-only users, a command-line job release client is also provided.

This process is best explained using an example:

1. John uses the `lp` command to print a Postscript document from his Unix terminal session. The job arrives in the queue under the username identity "john". (Although the name can't be trusted.)
2. The administrator has enabled the Print-Limit Pro release station on this print queue. The job is placed into a

holding state.

3. John must now authenticate, proving his identity and release the job. He chooses to do this via the command-line release station client.
4. John enters the command `release-print-job`. This command was set up by the system administrator.
5. John enters his username and password, confirms the job's name, cost and page count and releases the job for print. The following is an example of the output seen:

```
Please enter your username: john
Please enter your password:
Current balance: $8.00
18:04:13 - Name: "Configuring Linux", Pages: 2, Cost: $0.40
Print this job? [yes]
Released 1 job(s).
```

6. The job prints and John's account is charged.

Enabling the release station on a printer is a global option - it affects all jobs from all users. In some environments it may not be appropriate to have all jobs controlled via a release station - for example, jobs originating from Windows systems are already authenticated and should print directly. An alternate strategy is to have two queues for the same printer. The first queue does not use the release station option and only allows printing from authenticated workstations/users, while the other queue has the release station option enabled.

Print-Limit Pro managed print queues can be exposed for access via LRP/LPD using various methods. The optional Windows system component, "Print Services for Unix" can be used if the queues are hosted on a Windows system. An LPD interface is available for CUPS if the queues are hosted on Linux.

Tip

Windows system administrators can control which queues are exposed via LPR/LPD by setting printer permissions. Queues set up to explicitly *deny* permission to access from the SYSTEM account will *not* be accessible via LPR.

21.5.1. Installing the Command-Line Release Station Client

The following installation instructions assume the reader has prior Unix system administration experience.

1. Ensure that Java 1.5 or newer is installed on your system. To check, type `java -version` at the terminal. If you do not have Java 5 (1.5) or higher, please install it before continuing. Java is available for all major Unix operating systems.
2. Copy the release station files from your primary server to the system for which you wish to set up the command line release station client. These can be found in `[app-path]/release`. If your primary server is running Windows, this folder will be shared by default (accessible via `smb://[server]/release`). You may be able to use tools such as Samba (`smbclient`) to help copy these files. Ensure all files in the folder are copied taking care to preserve the existing heirarchy.

   The recommended location to install the release station command line client is `/usr/local/printlimit/release/`.
3. Ensure that the command line release station client has execute permissions for all users. This can be achieved with the following command when in the release directory:

```
chmod 755 ./pc-release-cmd-line.sh
```

4. For convenience, an alias can be created for the command line release station client. This is typically done by entering the following line in a global profiles file, or each user's `.profile` file:

```
alias "release-print-job" = \
    "/usr/local/printlimit/release/pc-release-cmd-line.sh
```

5. Users will now be able to release their print jobs by typing `release-print-job`.

It may also be useful to create a 'wrapper' for `lp` to run the command line release station client after a user has sent a print job. The following script `print-doc` provides an example:

```
#!/bin/sh
echo "Printing document using lpr..."
/usr/bin/lpr "$@"
echo "Printing done, calling program to release job..."
sleep 1
cd /usr/local/printlimit/release
./pc-release-cmd-line.sh
echo "Done."
```

For the convenience of users, the command line release station client should be installed on all systems where printing from the terminal may be performed.

21.6. Removing Print-Limit Pro from a Linux server

Print-Limit Pro can be completely removed from a system with the following procedure:

- Remove all files from the `printlimit` user's home directory.
- Remove the `printlimit` user account and home directory.
- Remove any server start scripts matching:

```
/etc/init.d/printlimit
/etc/rc*.d/*printlimit
```

21.7. Linux FAQ

21.7.1. Troubleshooting & Installation Questions

Q:
How can I run the root installation tasks manually?

A:
If you opt not to run the root level tasks during installation, or if they fail, they can be manually run later by running the following shell scripts as root:

```
~/server/bin/linux-*/roottasks
~/providers/print/linux-*/roottasks
```

Q:
I am unable to open a browser to `http://[server_name]:9191/admin`. What is wrong?

A:
The first step is to check to see if the Print-Limit Pro is listening on the port. The command:

```
netstat -anp | grep 9191
```

should list the `pc-app` as the owner of the process on port 9191. If nothing is listed, check that the application server has started (e.g. `ps -ef | grep pc-app`).

If the server is already running, the next step is to ensure no IP filtering is applied to the port. Some Linux distributions have strict `iptables` filters enabled by default. Ensure that port 9191 is accessible from all local network systems.

Q:

I would like to use a custom script to start the server. Is this possible?

A:

The SYSV style start script included should work with all systems using an `/etc/rc*.d` style boot process. Some administrators may wish to replace the `app-server` with a custom script that better fits in with their Linux distributions style guide. Administrators should consider storing this script outside the Print-Limit Pro install structure so it's not overwritten in any further upgrade.

Q:

Can I run/install Print-Limit Pro under an account other than "printlimit"?

A:

No. At the moment the installation, and other scripts, assume the existence of a user called `printlimit`. This may however change in the future. E-mail your thoughts to the development team!

Q:

Is an RPM or .deb package available?

A:

No. At the moment we're supplying it as a self-extracting and self-installing archive. This gives us the flexibility to support install-over-the-top for upgrades and maintain full control over the installation process. The process will also allow Print-Limit Pro to run and install on systems not using RPM or apt. We also plan on supporting other Unix based operating systems in the future such as FreeBSD and Solaris. The current installation method should work with all standard Linux distributions.

21.7.2. General Questions

Q:

Is Print-Limit Pro open source?

A:

Print-Limit Pro in not "open source" in reference to it being available under the GPL or another popular open source license. Source code is however provided to customers. As a company we are transparent in our development approach, work closely with our users, and support a number of open source projects both financially and with code submission. Print-Limit Pro however remains a commercial application with commercial support at the current time.

Chapter 22. Print Authentication

Modern large multiuser networks, like those typically seen in Higher Education, are made up of mix of operating systems, authentication methods, personal student laptops, print protocols and disparate networks. This heterogeneous mix poses problems for system administrators working towards a unified and centralized print management system. Print-Limit Pro sports an array of tools to help administrators meet their unification goals. Print-Limit Pro's flexibility is however a double-edged sword and the multitude of options also bring complexity. This section discusses cross-platform support in detail, and hopes to arm the reader with the knowledge needed to make the correct architecture decisions. Solutions are presented as "recipes" with the aim of directing the reader to appropriate procedures and other chapters.

The objective of a centralized and unified Print-Limit Pro system is to offer all users, irrespective of their operating system or access method, access to the full array of features in a secured and authenticated way. Print-Limit Pro offers cross-platform client software providing end-user features on all major operating systems, however the need for secured and authenticated access adds an extra, somewhat complex dimension.

22.1. About Authentication and Printing

22.1.1. What is authentication?

Authentication in a printing environment is the act of confirming the digital identity of the person who issued a print job. Knowledge of the user's identity allows Print-Limit Pro to offer the user access to functions such as allocating the cost of a job to their account, or offering them access to shared accounts. In a Windows domain environment, authentication is handled at the point of login using a username and password. A web-of-trust is then established between servers and services.

22.1.2. Why does authentication pose a problem?

By default Print-Limit Pro assumes the printer queues are authenticated and trusts the username that is associated with the print job. It is this user is charged for for the printing. On fully authenticated networks (like 100% Windows Active Directory networks), Print-Limit Pro can trust the username associated with the job. There are a few common scenarios where authentication is not as simple:

1. Generic, common, or shared user accounts. (e.g. generic "student" login).
2. Systems that auto-login as a set user.
3. Unauthenticated print queues or print protocols (e.g. LPR).
4. Users' personal laptops that are not authenticated on the network.

Generic or shared login accounts are seen in some computer lab and network environments. In these environments administrators ask users to log into selected systems using standard user names such as "student" or "user". This practice is particularly common on the Apple Mac operating system as a single login helps streamline system and application management. The use of the Window auto-login feature also poses a similar problem - authentication is not enforced at the time of system startup. An extra layer of authentication is required on these systems to correctly identify the person that performs printing.

Unauthenticated print queues also pose problems in cross platform environments. In an ideal world all computers would talk the same protocols and happily work together in a single centrally authenticated environment. We can come close to this goal in a 100% Microsoft Windows environment, however if we mix in Unix, Linux and Mac, it's a different story. Although initiatives such as CUPS (Common Unix Printing System) and the Internet Printing Protocol (IPP) offer some hope, unification in the area of authenticated printing is still some way off. Unfortunately technical reasons often prevent networks from using CUPS authentication or exclusively using the authenticated Microsoft printing protocol.

The use of personal laptops or other unauthenticated workstations in an otherwise authenticated network is another cause of problems. These machines may not be able to authenticate to your network for number of reasons:

- The operating system does not support authentication (like Windows Home editions).

- It is too complex to configure authentication on personal laptops.
- Users log in to their laptop with their personnally chosen username and password.
- You cannot force users to change the configuration of their personal laptops.

22.1.3. How does Print-Limit Pro address authentication?

If technical reasons prevent authentication at the print queue level, Print-Limit Pro provides a number of alternate authentication options. These options change Print-Limit Pro's default behavior of trusting the username associated with a print jobs, and instead the user will be required to re-authenticate before the job is printed. The two alternate authentication options are described below.

22.1.3.1. Popup Authentication (IP session based authentication)

This method involves associating the workstation's IP address with a user for a specified period of time - a session. Any print jobs arriving from this IP address are deemed to be associated with this user. Authentication is provided by the Print-Limit Pro client software in the form of a popup dialog requesting a username and password. Data is transmitted to the server via an SSL encrypted connection. To print with popup authentication the client software must be running on the workstations or laptops.

Popup authentication can be used to:

- Authenticate users that print from a generic login or auto-login account. This is done by flagging the generic account as unauthenticated in Print-Limit Pro.
- Authenticate users not authenticated to the network (e.g. personal laptop users). This is done by marking the print queues as unauthenticated in Print-Limit Pro.

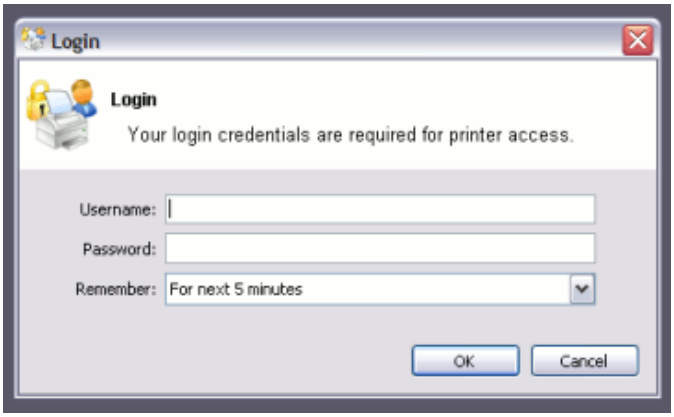


Figure 22.1. Print-Limit Pro client requesting authentication

More information on popup authentication can be found in Section 7.10, “Popup Authentication”.

22.1.3.2. Web Print

Web Print is a service for printing documents that are uploaded via a web browser. This provides a simple way to enable printing for laptop, wireless and anonymous users without the need to install print drivers.

With Web Print users are authenticated when they log into the Print-Limit Pro user web interface. Any documents they upload can then be tracked against their user name.

More information about Web Print is available in Chapter 19, *Web Print (Driver-less printing via a web browser)*.

22.1.3.3. Release Station Authentication

Release stations work by placing print jobs in a holding queue. Users must authenticate at a release station before

being given access to release their job. A release station normally takes the form of a dedicated terminal located next to the printer(s), however the holding queue may also be accessed via a web browser. The act of a user releasing a job causes it to be charged to their account. Release stations can be used without installing the client software on user's workstations.

The hold/release queues are enabled on a printer queue level within Print-Limit Pro

More information on setting up and using release stations is discussed in Chapter 10, *Hold/Release Queues & Print Release Stations*. To achieve authentication, the Release Station will be run in "release any" mode.

22.1.3.4. Choosing the right authentication option for your network

The choice of the authenticatation approach depends on the constraints of your network and your requirements. Below are some points to consider when making this decision:

- Popup Authentication: Usually the most user-friendly option, but it requires the client software to be installed and running on all workstations that print. In some environments it is not possible to mandate that software be installed on personal laptops.
- Release Station Authentication: Users do not need any additional software installed but the process of releasing a print job is more involved. You must install standard release stations nearby all your printers, or make use of the end-user web release station. If you are already using hold/release queues, then it makes sense to also use them for authentication.

22.1.3.5. Handling partially authenticated networks

Many sites have a heterogenous network with a mix of both authenticated an unauthenticated printing. A common example, is a college where all lab computers are connected to the domain and users must login to the workstations to print. The college also allows students to print using their personal laptops that are not authenticated on the network.

An administrator can choose to enable Print-Limit Pro authentication for all users. This is the simplest to set up but may be inconvenient for users who are already fully authenticated. Why should an authenticated user have to reauthenticate with Print-Limit Pro to print?

To overcome this it is recommended to set up two sets of print queues, one for the authenticated users and another for the unauthenticated users. These queues can point to the same physical printers, but are configured differently in both Print-Limit Pro and the operating system. The authenticated print queues:

- Must only be accessible to authenticated users (i.e. through network security or operating system permissions).
- Should not have the authentication enabled within Print-Limit Pro (i.e. do not enable the hold/release queue or unauthenticated printer options on the print queue).
- Should not be published to unauthenticated users.

The unauthenticated print queues:

- Must be configured to allow printing by unauthenticated users.
- Must have the authentication enabled within Print-Limit Pro. i.e. Enable the hold/release queue or flag the printer as unauthenticated.
- Must be published to anonymous users so they know how to connect/user the printers.

If the descision as been made to split up printers into two seprate queues (authenticated and unauthenticated), administrators can use tools such as IP address filtering, firewalls, or user/group access permsisions to control who has access to which set of queues (i.e. deny "guest" account access on authenticated queues in Windows).

For a detailed explanation of setting up Print-Limit Pro for unauthenticated laptop printing see Section 22.2, “Handling Unauthenticated (non-domain) Laptops”

For discussion of many other authentication scenarios see Section 22.3, “The Authentication Cookbook - Recipes

by example”

22.2. Handling Unauthenticated (non-domain) Laptops

Schools and colleges commonly allow students to use their personal laptops for printing to campus printers. They also want to allocate/charge printing from these unauthenticated users to the correct person. However if the systems haven't authenticated with the network, then user credentials are not provided with the print job (or worse, their personal laptop username is associated with the job). For example, on Windows networks, the jobs may list as `guest`. Print-Limit Pro addresses this this problem by providing alternate print authentication options. This section provides a step-by-step guide to configuring these authentication options.

Before continuing it is highly recommended to read the introduction to print authentication (see Chapter 22, *Print Authentication*). It introduces the important concepts required to understanding print authentication.

22.2.1. Option 1: Popup Authentication for Unauthenticated Laptops

Having chosen popup authentication to authenticate your laptop users, you should review Section 7.10, “Popup Authentication” for a detailed explanation of the feature.

22.2.1.1. Step 1: Decide whether to enable popup authentication on all printer queues

First decide whether to enable authentication for all queues, or only the queues accessed by unauthenticated laptop systems. For more information please read Section 22.1.3.5, “Handling partially authenticated networks”.

If you choose to only enable authentication for your unauthenticated laptops, you must configure a second set of unauthenticated print queues. These queues can point to the same physical printers as your authenticated queues.

Often the simplest way to set up these unauthenticated queues is to configure a separate print server that allows anonymous printing. You can make use of a firewall or operating system permissions to ensure that the anonymous users cannot access the "authenticated queues". On Windows networks, you may need to enable the `guest` account on the domain/system so users running the "Home" editions of Windows can print to these queues.

22.2.1.2. Step 2: Install/run the user client software on laptops

To use popup authentication, the client software must be installed and running on the unauthenticated laptops. You should make the client available for your users along with instructions of how to install the software on their laptops. The software can be easily installed on all common operating systems (Windows, Mac and Linux).

For more information on installing and deploying the client software see Section 5.2.1, “User Client Deployment”.

22.2.1.3. Step 3: Mark the printer queue as "Unauthenticated"

By default Print-Limit Pro trusts the usernames that are associated with the print job. When printing from unauthenticated laptops this username cannot be trusted. By flagging the printer queue as "unauthenticated", Print-Limit Pro will no longer trust the username and will prompt the user to authenticate.

Advanced: An alternate approch on Windows networks is to enable the **unauthenticated** option at the user-level on `guest` only rather than at the queue level.

To flag the printer as Unauthenticated:

1. Log in as the built-in `admin` user.
2. Click on the **Printers** section.
3. Select the printer you wish to mark as *Unauthenticated*.
4. In the **Configuration** section, enable the **Unauthenticated printer** checkbox.
5. Press the **OK** button to save the changes.
6. Repeat this process for each printer that requires popup authentication enabled.

Important

Once the printer is flagged as *Unauthenticated*, no print jobs will be printed until the user has authenticated using the client software. It is important that all workstations using these print queues are running the client software.

22.2.1.4. Step 4: Test the popup authentication

It is important to test the popup authentication once enabled. To do this:

1. Start-up an unauthenticated laptop/workstation.
2. Ensure that the user client software is installed and running.
3. Perform a test print job to the queue on the print server you flagged as Unauthenticated.
4. The client software should popup the authentication dialog box. The print job should not print until you successfully authenticate.
5. Once authenticated, verify that the print job completes and the job is logged against the correct username in **Printers->Print Jobs**.

22.2.2. Option 2: Release Station Authentication for Unauthenticated Laptops

Having chosen release stations to authenticate your laptop users, you should review Chapter 10, *Hold/Release Queues & Print Release Stations* for a detailed explanation of the feature.

22.2.2.1. Step 1: Decide whether to enable release station authentication on all print queues

First decide whether to enable the the hold/release queue for all print queues, or only the queues accessed by unauthenticated laptop systems. For more information please read Section 22.1.3.5, “Handling partially authenticated networks”.

If you choose to only enable the hold/release queue for your unauthenticated laptops, you must configure a second set of unauthenticated print queues. These queues can point to the same physical printers as your authenticated queues.

Often the simplest way to set up these unauthenticated queues is to configure a separate print server that allows anonymous printing. You can make use of a firewall or operating system permissions to ensure that the anonymous users cannot access the "authenticated queues".

22.2.2.2. Step 2: Choose which Release Station interface to use

You can choose between the Standard/Software release station interface and the end-user web interface. The standard release station:

- Requires a dedicated workstation nearby the printers that is configured to run the release station.
- Requires less user education because when they walk up to fetch their print jobs it is obvious they need to use the release station to user the job.

The end-user web release station:

- Requires no workstations configured near the printers. Users simply use a web browser to login to the end-user web interface and release their jobs.
- Users must be provided with instructions on how to print and then login to the web release station to release their print jobs.

After choosing the release station interface, proceed to the appropriate step below.

22.2.2.3. Step 3a: Run and configure the Standard Release Station

If using the standard release station:

1. Deploy the standard release station to workstations located nearby your printers. See Section 10.3, “Release Station Configuration” for information on deploying the release station.
2. Run the release station in "Release Any" mode which allows users to login and see all print jobs awaiting release. When they release a job it will be charged to their user account. For more information see Section 10.3.3.1, “Release Station Modes”.

22.2.2.4. Step 3b: Enable and configure the End-user Web Release Station

If using the end-user web release station:

1. Log in as the built-in `admin` user.
2. Click on the **Options** section.
3. In the **User Features** section, enable the **Allow users to view held jobs (hold/release queues)** option.
4. Change the **Users have permission to** setting to **Release any jobs (charge to their account)**.
5. Press the **Apply** button to save the changes.

22.2.2.5. Step 4: Enable the Hold/Release queue for the print queues

By default, Print-Limit Pro allows the jobs to be printed without any interaction from the user. The hold/release queue feature will hold the print job until the user logs into a release station and releases the job. To enable the hold/release queue for a printer:

1. Log in as the built-in `admin` user.
2. Click on the **Printers** section.
3. Select the printer you wish to enable the Hold/Release queue on.
4. In the **Configuration** section, enable the **Enable hold/release queue** checkbox.
5. Press the **OK** button to save the changes.
6. Repeat this process for each printer that requires the hold/release queue enabled.

Important

Once the hold/release queue is enabled, no jobs will print until released using a release station. It is important to instruct your users how to use the release station, otherwise they will not be able to print.

22.2.2.6. Step 5: Test the release station

It is important to test the release station once enabled. To do this:

1. Start-up an unauthenticated laptop/workstation.
2. Perform a test print to a print queue with the hold/release queue enabled.
3. For the standard release station, go to the print release station and login as a user. Select the job you printed and press the **Print** link to release the job. The job should begin to print.
4. For the end-user web release station, login to the end-user web pages at `http://yourserver:9191/user`. Select the **Jobs pending release** link. Select the job you printed and press the **[print]** link to release the job. The job should begin to print.
5. Login to the Print-Limit Pro admin pages and verify the print job was allocated to the correct user in the **Printers->Print Jobs** section.

22.3. The Authentication Cookbook - Recipes by example

This section discusses various solutions to the "authentication problem" in recipe style. The aim is not to provide detailed step by step instructions, but rather guide the user to the relevant procedures and chapters in other parts of the manual.

22.3.1. Windows systems with generic logins

This scenario arises either when users log into systems using a common username such as `user` or `student`, or if the workstations auto-login as a generic user. See introduction for details.

22.3.1.1. Preferred Method:

- Ensure all users have an account (username and password) on the server (or domain) hosting the Print-Limit Pro software.
- Install client software on all systems. See Section 5.2, “User Client” for more detail.
- Enable popup authentication by selecting the **Unauthenticated** option on the corresponding generic user account.
- See Section 7.10, “Popup Authentication” for more detail.

22.3.1.2. Other Methods:

1. Use standard release station in "Release Any" mode, or the end-user web release station configured to allow users to release any jobs. See Chapter 10, *Hold/Release Queues & Print Release Stations*.
2. Consider implementing domain level logins.

22.3.2. Windows laptops that do not authenticate against a domain

Portable systems may spend most of their time outside the organization's network and hence setting up domain authentication may not be desirable. The laptops/notebooks are often owned by a single individual and are not under the control of a central administrator.

22.3.2.1. Preferred Method:

Use popup authentication or hold/release queues as discussed in Section 22.2, “Handling Unauthenticated (non-domain) Laptops”.

22.3.2.2. Alternate Method 1:

If using a version of Windows that can authenticate with a domain (i.e. not the Windows Home editions), then the laptop can be configured to authenticate with the network as follows.

- Teach the user how add their domain username and password to their **Stored usernames and passwords**:
  1. **Start** → **Control Panel** → **User Accounts**
  2. Select the user's laptop login account
  3. Click Manage my network passwords
  4. Click **Add**
  5. Enter the name of the server and the user's network domain username and password
- Teach the user how to add a network printer in the form `\\server\printer`.
- *Optional:* Locally install client software using the `client-local-install.exe` install program. This is located on the `\\Server\PCClient\win` share. At the end of the install process the client will open asking the user to confirm their network identity. See Section 5.2, “User Client” for more detail.

22.3.2.3. Alternate Method 2:

- Add a generic "LaptopUser", or "guest" user account to the domain. Make the password known to all users (e.g. `password`).
- Set the unauthenticated option on this user (enable popup authentication).
- Locally install client software using the `client-local-install.exe` install program. This is located on the `\\Server\PCClient\win` share. At the end of the install process the client will open asking the user to confirm their network identity. See Section A.5, “User Client Options” for details.
- Teach the user how to add a network printer pointing to `\\server\printer`.
- See the preceding scenario for more detail.

22.3.3. Windows print server using LDAP or eDirectory authentication

The Microsoft Windows operating system does not play well in non Active Directory domain environments such as LDAP or eDirectory. Although it is possible to configure a Windows print server on any network, Windows does not normally provide the ability to use LDAP as an authentication source. Jobs will either list under a local Windows user identity or a guest account. Print-Limit Pro's popup authentication, bound to LDAP, can be used to work around this limitation.

22.3.3.1. Preferred Method:

- Set up the Windows server and install and share printers.
- Set printer permission to allow printing from a general "guest" type account. This will usually take the form of the built-in guest account, or a local account with a known username and password (e.g. `printuser`).
- Configure printers on each workstation. Ensure all workstation users can print and jobs list in the print queue under the guest account configured in the previous step.
- Install the Print-Limit Pro software. Select the LDAP server as your user/group source. Print-Limit Pro will then use this source for the user list and authentication. See Section 12.3.9, “Using LDAP for user synchronization” for more information about LDAP.
- Set the **Unauthenticated** option on each printer (print queue). This will enable popup authentication. See Section 7.10, “Popup Authentication” for more information.
- Install client software. See Section 5.2, “User Client” for more detail.

22.3.3.2. Other Methods:

1. Use release station. See Chapter 10, *Hold/Release Queues & Print Release Stations*.

22.3.4. Mac OS X systems with generic user accounts

Mac OS X workstations in a lab environment are often set up so users log in using a common, generic, or standard account. For example, "macuser" or "student".

22.3.4.1. Preferred Method:

- Install client software. See Section 5.2, “User Client” for more detail.
- Add a domain/network user account that matches the generic login account (i.e. "macuser"). This ensures that account will list in Print-Limit Pro.
- Set the **Unauthenticated** option on the "macuser" account.
- Add the printer(s) so jobs list under the "macuser" account. If the print queues are hosted on Windows, add the printer using Samba. (e.g. A `DeviceURI` like `smb://macuser:password@servername/printer`). See Chapter 23, *Mac Printing in Detail* for an explanation on how to add a printer using this method.

22.3.4.2. Other Methods:

1. Use standard release station in "Release Any" mode, or the end-user web release station configured to allow users to release any jobs. See Chapter 10, *Hold/Release Queues & Print Release Stations*.
2. Consider setting up domain-level authentication.

22.3.5. Mac OS X systems using domain authentication via Open Directory

Mac systems can be configured to authenticate users via a central Mac OS X server running Open Directory. Each user has their own login account.

22.3.5.1. Preferred Method:

- Set up print queues on the Mac OS X Server.
- Set up Print-Limit Pro on the server either as a primary server, or as a secondary server reporting to another primary server (either Mac, Linux or a Windows system). See Chapter 2, *Installation*.
- Add printers to each Mac workstation. Ensure the local printers point to the shared print queue set up on the server.
- *Optional:* Install client software as discussed in Section 5.2, “User Client”.

22.3.5.2. Other Methods:

1. Use standard release station in "Release Any" mode, or the end-user web release station configured to allow users to release any jobs. See Chapter 10, *Hold/Release Queues & Print Release Stations*.
2. Set up print queues on a Windows system and use popup authentication - see next recipe.

22.3.6. Mac OS X systems using domain authentication via Windows Active Directory

Mac systems can be configured so users log in using their Windows Active Directory domain username and password. The Mac Windows printer support using Samba/SMB however requires printers to be added using a single username and password and this is shared by all users. For this reason an extra layer of authentication is required.

22.3.6.1. Preferred Method:

- Host printers and the Print-Limit Pro system on the Windows server.
- Ensure the print server is running in **Mixed mode** or **Pre-Windows 2000 Compatibility Mode**. Macs currently have problems with `Native Mode` networks.
- Add a domain/network user account that matches the generic login account (i.e. "macuser"). This ensures that the `macuser` account will appear in Print-Limit Pro's user list.
- In Print-Limit Pro, turn on the **Unauthenticated** option on the "macuser" account to enable popup authentication. Also ensure that the account has zero balance and is restricted.
- Add the printer(s) so jobs list under the "macuser" account. If the print queues are hosted on Windows, add the printer using Samba. (e.g. A `DeviceURI` like `smb://macuser:password@servername/printer`). See Chapter 23, *Mac Printing in Detail* for an explanation on how to add a printer using this method.
- Install client software as discussed in Section 5.2, “User Client”.

22.3.6.2. Other Methods:

1. Use LPR as a connection method. See Section 23.2.3, “Scenario Three: Multi-user Macs using LDAP or Active Directory authentication” in detail.

2. Use standard release station in "Release Any" mode, or the end-user web release station configured to allow users to release any jobs. See Chapter 10, *Hold/Release Queues & Print Release Stations*.
3. Host printers on a Mac Server (see the previous recipe).

22.3.7. Mac OS X laptops (or single user systems) printing to Windows print queues

Mac systems that are owned/used by a single user can benefit from having the printers added in such a way in that they automatically authenticate under their identity.

22.3.7.1. Preferred Method:

- Teach users how to add printers using the method described in Section 23.2.1, “Scenario One: My Own Mac (Single User)”.
- Use popup authentication or hold/release queues as discussed in Section 22.2, “Handling Unauthenticated (non-domain) Laptops”.

22.3.7.2. Other Methods:

1. Locally install client software using the `client-local-install` program located in the directory `[app-path]/client/mac`. This install script will cause the client to display a popup asking them to confirm their network identity (via username/password).

22.3.8. Linux Workstations in a lab environment with printers hosted on a Windows server

Linux workstations typically use the CUPS print system. CUPS, through the use of Samba, can print directly to Windows print queues.

22.3.8.1. Preferred Method:

- Ensure the system is configured to deny remote shell access to standard users - that is, only allow direct screen/console access. This ensures the system's IP address can be associated with a single user providing a suitable environment for popup authentication.
- Ensure the print server is running in **Mixed mode** or **Pre-Windows 2000 Compatibility Mode**. Some Linux distributions currently have problems with `Native Mode` networks.
- Add a domain/network user account that matches the generic login account (i.e. "linuxuser"). This ensures the "linuxuser" account will appear Print-Limit Pro's user list.
- In Print-Limit Pro, turn on the **Unauthenticated** option on the "linuxuser" account to enable popup authentication. Also ensure that the account has zero balance and is restricted.
- Add the printer(s) so jobs list under the "linuxuser" account. If the print queues are hosted on Windows, add the printer using Samba. (e.g. A `DeviceURI` like `smb://linuxuser:password@servername/printer`). Please refer to the CUPS or distribution documentation to read more how to add a CUPS printer using an `smb` backend.
- Install client software as discussed in Chapter Section 5.2.1.3, “Deployment on Linux and Unix”. If users login to the workstations using a username that matches their Active Directory password, no additional client configuration is required. If users log in using a generic or non-matching account, use command-line options or the `config.properties` file to force the client to display under the user's domain identity. See Section A.5, “User Client Options” for more information.

22.3.8.2. Other Methods:

1. Use standard release station in "Release Any" mode, or the end-user web release station configured to allow users to release any jobs. See Chapter 10, *Hold/Release Queues & Print Release Stations*.

2. Host printers on a CUPS server running on Linux.
3. Install "Print Services for Unix on the Windows server" and use a LPR rather than CUPS (or CUPS with an LPR backend).

22.3.9. Linux Workstations in a lab environment with printers hosted on Linux CUPS server

Many network administrators running Linux labs may be most comfortable hosting the printers on a Linux server running CUPS. For convenience, CUPS is set up without authentication.

22.3.9.1. Preferred Method:

- Set up CUPS print queues on a Linux server.
- Ensure each user has an account on this system (or the domain depending on Print-Limit Pro's selected user list source)
- Set up Print-Limit Pro on the server either as a primary server, or as a secondary server reporting to another primary server (either Mac, Linux or a Windows system). See Chapter 2, *Installation*.
- Set the **Unauthenticated** option on each printer (print queue). This will enable popup authentication. See Section 7.10, “Popup Authentication”.
- Ensure the system is configured to deny remote shell access to standard users - that is, only allow direct screen/console access. This ensures the system's IP address can be associated with a single user providing a suitable environment for popup authentication.
- Install client software as discussed in Section 5.2, “User Client”.

22.3.9.2. Other Methods:

1. Use standard release station in "Release Any" mode, or the end-user web release station configured to allow users to release any jobs. See Chapter 10, *Hold/Release Queues & Print Release Stations*.
2. Use CUPS Authentication.

22.3.10. Linux laptops (or single user systems)

Modern Linux laptops will make use of the CUPS print system. This environment is equivalent to the Mac laptop recipes described above.

22.3.11. Multiuser Unix terminal servers

Unix or Linux systems allowing remote SSH, Telnet, VNC, or X connections differ from the other scenarios discussed above. These systems can not use the popup authentication as it is not possible to uniquely identify a user from the system's IP address. The only secure option is to use the release station.

22.3.11.1. Preferred Method:

- Setup Print-Limit Pro on your preferred server - this does not need to be the multiuser terminal system itself. It could be another Windows or Linux server.
- Ensure Print-Limit Pro sources its user list from the same source as that used by the multiuser terminal server - most likely an LDAP server.
- Enable the release station option on all printers that will be accessed via users of the multiuser terminal system. Important: Enabling the release station option may be incompatible with objectives of other operating systems so it may be appropriate to set up a separate set of print queues. See Further Recommendations below for more detail.
- Set up a release station. This commonly takes the form of a dedicated terminal located near the printers, however other options worth considering using the Print-Limit Pro end-user web interface to release jobs, or the

release station command-line client. See Chapter 10, *Hold/Release Queues & Print Release Stations* for details.

- Instruct users on how to use the release station.

22.3.11.2. Other Methods:

1. No alternate methods.

22.3.12. Further Recommendations

1. Decide on an authentication method and use it consistently throughout the organization and network. For example, using popup authentication on some systems and release stations on others may be confusing for users. Try to offer a consistent user experience.
2. Where possible, configure workstations to communicate with the server using the server's native print protocol. For example, use SMB or standard Windows printing when printing to a Windows server, and Internet Printing Protocol (IPP) when printing to a CUPS server. Servers are most reliable when talking their own language!
3. Consider the scope of any configuration change. For example, enabling popup authentication or release station on a print queue will affect ALL users of that printer. For example it may be desirable to ask Linux users to use the release station, however this may be regarded as an inconvenience for Windows users. In these cases, it may be advantageous to set up two print queues for each physical printer - the first queue without release station enabled for Windows users and the other with the release station option enabled for Linux users.

Chapter 23. Mac Printing in Detail

Apple Mac printing is a complex topic and deserves its own chapter. The developers started on Print-Limit Pro for the Mac in 2006. Developing software on the Mac was an enjoyable experience and presented very few technical challenges. The challenges instead came in the area of general printer setup and idiosyncrasies with printer configuration. Mac administrators will be all too familiar with these challenges! This chapter addresses Mac printer setup (on both the client and server) and presents solutions for common setup and deployment scenarios. The Chapter is split into two sections:

- 1st Section: Organizations hosting their print queues on a Mac (e.g. Mac OS X Server)
- 2nd Section: Organizations hosting their print queues on Windows Servers but supporting Mac clients

In most cases only one section will apply on your network. Jump to the relevant section as appropriate.

23.1. Mac hosted print queues

This section discusses printer setup on systems where the print queues are hosted on a Mac system. For example, Print-Limit Pro is installed on a Mac system such as Mac OS X Server. See the next section if your print queues are hosted on a Windows server.

This section assumes Mac OS X Server (e.g. Mac OS 10.6 Server), however Print-Limit Pro also supports running on the workstation version of Mac OS X. These notes apply in part to both operating systems. The term 'server' is used to represent the system hosting the Print-Limit Pro software, and not necessarily the edition of Mac OS X.

Before we delve into configuring server based print queues in a Mac environment, we'll first take a few moments to discuss common terminology:

Note

Print Queue: There are typically two ways of providing shared multi-system access to a printer:

1. Configure each system to print directly to the device. The device needs to be networkable (e.g. have an Ethernet connection) and support multiple connections.
2. Configure a shared print queue. In this setup, only one system connects directly to the device (e.g. a server) and in turn the device is shared on the network via a print queue. Other systems on the network print to the shared queue rather than directly to the device.

Option 2 is regarded as a better solution on multi-user networks as it provides a higher level of scalability, allows for centralized administration, and allows administrators to move or remap devices without needing to propagate changes to workstations. Print-Limit Pro requires a shared print queue as it works by intercepting the jobs as they pass through the server's queue.

CUPS: CUPS is the print queue system used by Mac. This is the same queue system used by many other UNIX based platforms including popular Linux distributions. Apple is a major supporter of CUPS.

IP Printing: This is a generic term used to describe a number of print protocols that are used to exchange print documents between a computer, a server queue, or a physical printer. (Note: This term is also occasionally used incorrectly to describe the "JetDirect" print protocol discussed below)

IPP: This is an acronym for Internet Printing Protocol. This is the "native" print protocol used by CUPS and hence the Mac. It's a modern protocol designed to work well on modern networks including local networks, or even over the internet or a WAN.

LPR: LPR/LPD is the traditional UNIX based print protocol.

JetDirect/Socket: This is a very simple print protocol used to transmit print jobs to a physical printer on a TCP network. The printer simply accepts connections on port 9100. In Windows, this print protocol is often referred to as a `Standard TCP/IP Port`, and in some cases generally as IP

> Printing. Almost all network printers support this method.
>
> **Bonjour Printing:** This is not a print protocol, but instead is a way of publishing printers on a network so workstations can locate the device/queue.

Where possible we have designed Print-Limit Pro to work with all print protocols, however we do recommend some over others. The following setup procedure highlights methods that have shown to work in most environments.

The Print-Limit Pro compatible setup procedure can be summarized as follows:

1. Step 1: Install the printers on the server using a compatible driver
2. Step 2: Enable Printer Sharing
3. Step 3: Set up the printers on the workstations to point to the server's shared queue

Each one of these steps is discussed in detail below:

23.1.1. Step 1: Installing the printers on the server

Install the printer on the system running Print-Limit Pro using a compatible driver. For example, a driver supplied by Apple or the manufacturer. If there is a choice of driver, opt for a Postscript or PPD based driver. Follow the manufacturer's suggested setup procedure, or Apple's recommended Queue setup procedure (Apple Print Services Administration Guide) if running on 10.5 Server. If the manufacturer supports various connection methods, we recommend using JetDirect/Socket if possible. Here is an example of a procedure that will set up a standard printer using a plain JetDirect/Socket connection on all Mac versions (server/workstation 10.4/10.5):

1. From the **Apple Menu** select **System Preferences...**
2. Select **Print & Fax**
3. Click on the **+** button to add a new printer
4. Click on the **IP** icon on the toolbar
5. Select **HP Jetdirect - Socket** in the Protocol list
6. Enter the printer's assigned IP address
7. For convenience, give the printer a simple name *without* spaces
8. Select the driver or printer model from the list and press **Add**

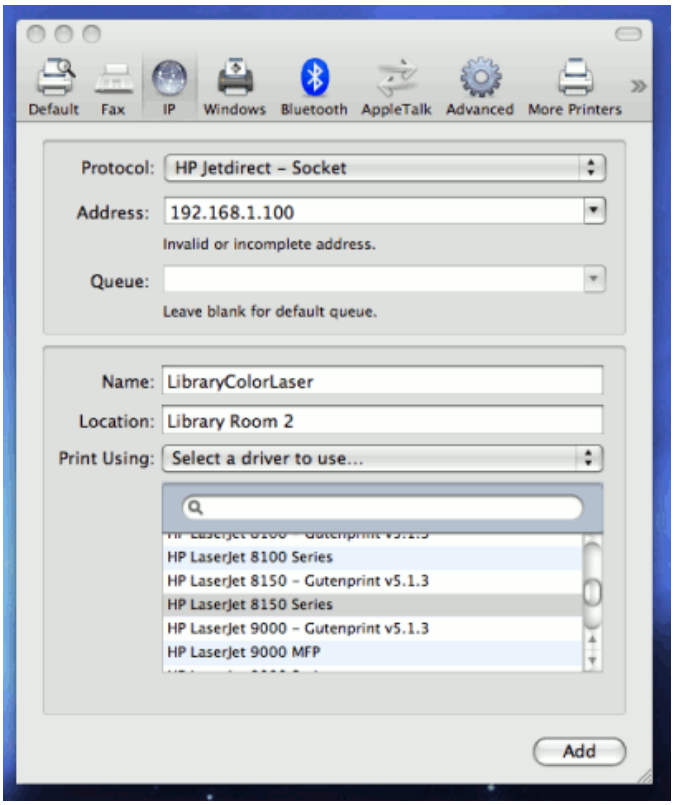


Figure 23.1. Setting up a printer (direct) on Mac OS 10.5 Server using Jetdirect

Test printing using a local application (e.g. Print a web page from Safari). Confirm that printing works as expected.

Important

For new printers it is necessary to configure Print-Limit Pro to monitor the new printer. This is discussed in Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

Important

Continue to the next step only after printing from the server is working. If you have problems, see the troubleshooting section below.

23.1.1.1. Optional Hardware Configuration

Some high-end printer models support other connection methods such as LPR, IPP or even direct AppleShare or Boujour printing. If the printer offers the option to disable these protocols, e.g. via a web based configuration page, take the time to turn these off. This will minimize the chance of incorrect future configuration, and minimize the chance of a workstation user discovering the printer directly. Some printers also support access control via IP addresses. If available, consider setting access control so only the server IP can submit print jobs to the physical printer.

23.1.1.2. Notes & Troubleshooting

- If your printer does not support JetDirect/Socket, consider using LPR as the 2nd choice.

- Some printers support proprietary connection methods (e.g. selected Epson printers). Always try Jetdirect/Socket first and use proprietary methods as a last resort.
- If you're not able to install or find a driver for your printer, try the **Generic Postscript Driver/Printer**.

23.1.2. Step 2: Enable Printer Sharing

By default locally installed printers are not shared as public print queues. Printer sharing needs to be manually enabled. If you're running the workstation version of Mac OS X, this is done by enabling "Printer Sharing" under System Preferences. On Mac OS X Server, use the following procedure:

1. Open **Server Admin**, and select your server.
2. Select **Settings**, then **Services** and enable the **Print** service.
3. **Save** the change.
4. In the server list on the left, select your server, expand, and highlight the newly created **Print** service.
5. Select **Queues** from the toolbar. Your newly installed printers should be listed.
6. Select each printer and ensure that at least the **IPP** protocol is selected. It may also be useful to enable **LPR** and expose via Bonjour.
7. Ensure "Enforce Quotas for this queue" is turned *off* as Print-Limit Pro manages this.
8. Click the **Save** button or save when prompted.

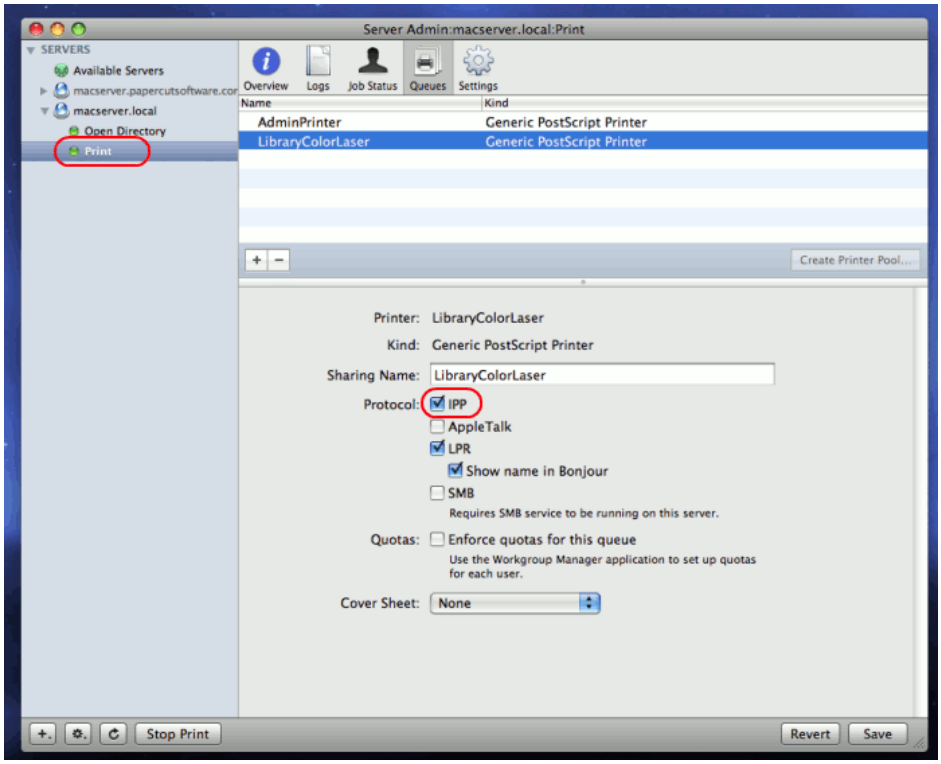


Figure 23.2. Enable IPP on each queue via Server Admin

9. Restart the **Print Service** by pressing **Stop Print** followed by the **Start Print**. *Note:* In some cases we've seen issues where server admin changes have not been immediately picked up. If you suspect this, and can afford the downtime, schedule a system restart now.

23.1.3. Step 3: Set up the printers on the workstations (pointing to the shared server queues)

Once the printers are set up on the server and shared, the next step is to install the printers on the workstations. In the Windows world this is an easy process - the user just double-clicks on the print queue and the drivers are automatically deployed and configured. The process is a little more manual on the Mac, but we'll also discuss a method of automating deployment via the Workgroup Manager. First, we'll address manual setup.

The goal is to add the printer on the workstation so it communicates with the server (its queues) rather than directly to the printer. Protocols include, IPP, LPD, or LPD added via Bonjour. The recommended setup is to use IPP as this is the native protocol.

23.1.3.1. Recommended Manual Setup

1. Log onto a workstation
2. Open **System Preferences** → **Print & Fax** (or the **Printer Setup Utility** if using Mac OS 10.4).
3. Click the add new printer button (or **+**).
4. Select **IP** as the type and select **IPP** as the **Protocol**.
5. Enter your server name (or the server's IP Address) in the **Address** field.
6. Enter the the printer's **Queue Name** *prefixed* with `printers/` in the **Queue** field. For example: `printers/my_office_printer`. *Note:* if you have selected LPR as the connection method, the `printers/` prefix will not be required (see the following section).

   The queue name of the printer will have been set when the queue was first created on the server, and may be different to the printer name. On Mac OS 10.5, the queue name can be found at: **System Preferences** → **Print & Fax** → **[select printer]** → **Options & Supplies** → **General** → **Queue Name**. On Mac OS 10.4, the queue name can be found at: **System Preferences** → **Print & Fax** → **[select printer]** → **Printer Setup...** → **Name & Location** → **Queue Name**.
7. Select the appropriate printer model. If this is not listed, you may need to install the manufacturer's driver, then repeat steps 2 through 6.
8. Take some time to print from the workstation and confirm that printing succeeds.

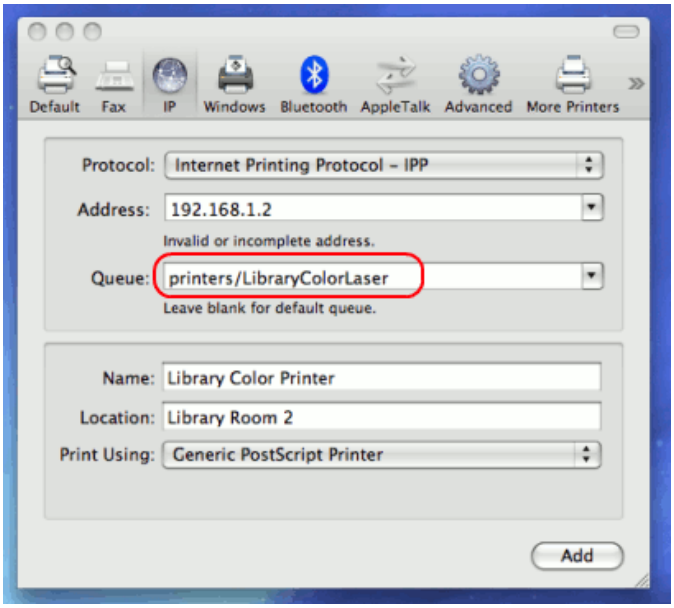


Figure 23.3. Setting up a workstation printer on Mac OS 10.5

If you have problems obtaining a driver for your printer, try the **Generic Postscript Driver**. This option will work with most printers. If after a test print the printer stops with a connection error, check the printer sharing permissions on the server or try the alternate method discussed below.

23.1.3.2. Alternate Manual Setup (LPD/LPR)

1. Log onto a workstation
2. Open **System Preferences** → **Print & Fax** or the **Printer Setup Utility** if using Mac OS 10.4.
3. Click the add new printer button (or **+**).
4. Select **IP** as the type and select **LPD** as the **Protocol**.
5. Enter your server name (or the server's IP Address) in the **Address** field.
6. Enter the the printer's **Queue Name** in the **Queue** field.

   The queue name of the printer will have been set when the queue was first created on the server, and may be different to the printer name. On Mac OS 10.5, the queue name can be found at: **System Preferences** → **Print & Fax** → **[select printer]** → **Options & Supplies** → **General** → **Queue Name**. On Mac OS 10.4, the queue name can be found at: **System Preferences** → **Print & Fax** → **[select printer]** → **Printer Setup...** → **Name & Location** → **Queue Name**.
7. Select the appropriate printer model. If this is not listed, you may need to install the manufacturer's driver, then repeat steps 2 through 6.
8. Take some time to print from the workstation and confirm that printing succeeds.

23.1.4. Publishing the printer via Workgroup Manager

Manually installing the printer on each desktop on a large network may be tedious. Large networks using Open Directory may benefit from automating the process using Workgroup Manager. The key to successfully deploying/publishing printers via the Workgroup Manager is to publish the configuration from a working *workstation* rather than the server itself. This is counter intuitive as normally administration is conducted by running Workgroup Manager on the server itself. This however would publish the server's printer configuration (the server is configured to print direct to the device and not to the queue hence this is why it's not appropriate to publish its configuration). Instead we need to install the Workgroup Manager software on a configured workstation/client and publish its known configuration. Use the following procedure:

1. Select one workstation on your network. Follow the manual setup procedure as discussed above.
2. Test and confirm this workstation is configured and printing correctly. Also choose other settings as appropriate such as tray, duplex and other defaults.
3. Install the *Workgroup Manager* on this client workstation (found on the Mac OS X Server install disk).
4. Open the Workgroup Manager, connect to your directory and select an appropriate user group or computer group used to manage client settings.
5. Enter the **Settings/Preferences** area and select **Printing**.

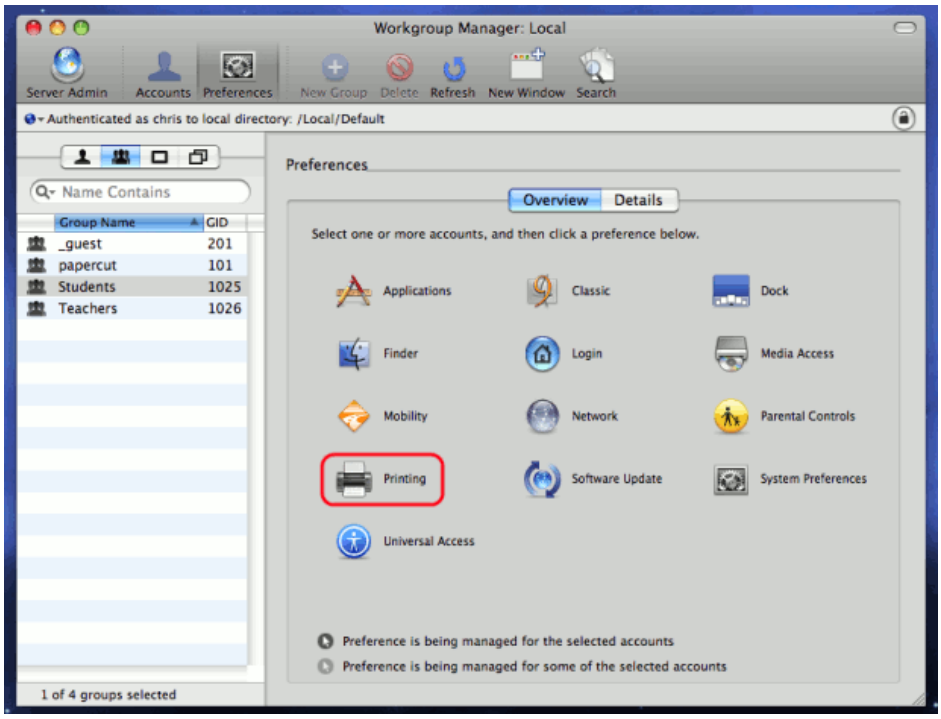


Figure 23.4. Printing settings via the Workgroup manager

6. Select **Manage Always** and add printer(s) set up in step 1.

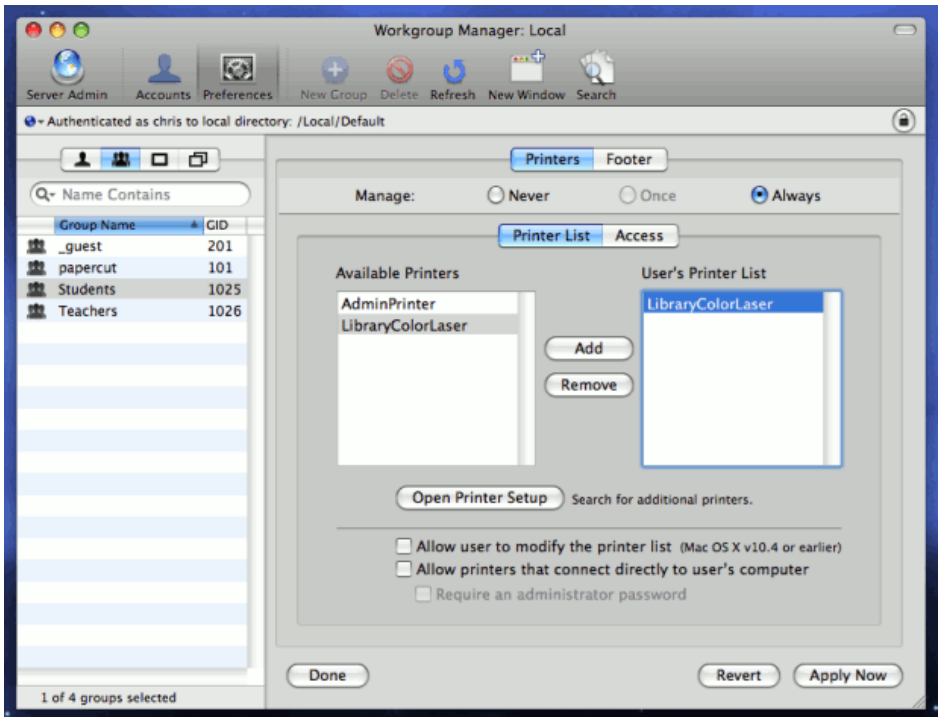


Figure 23.5. Add printer appropriate to the container (users, group, or computer)

7. Save settings and exit (e.g. click **Done**).
8. Log onto *another* workstation and confirm that printer settings are being published as expected.

Tip

- Only publish the printer configuration after it's been tested.
- If you have problems with the manufacturer supplied driver, try the "Generic Postscript Printer"
- Always publish the printer config from a tested client workstation and never from server itself.

23.1.5. Unauthenticated systems (e.g. Laptops)

The print queues in current Mac OS X server releases (up to and including 10.6) are unfortunately unauthenticated (editor's note: CUPS supports authentication, however Apple have decided not to expose/support this feature). Authentication in an Open Directory environment is instead performed at the time of system login. Unauthenticated systems such as laptops however fall outside this check. The introduction of unauthenticated systems on your network mandates the need for an extra layer of authentication. Print-Limit Pro offers two options:

1. Popup authentication via the client software, or
2. authentication via a release station or the web based release interface (end-user login -> **Jobs pending release**).

Network administrators must decide if the authentication policy/procedure is to be applied to all network systems, or just "untrusted" laptops.

23.1.5.1. Network-wide policy

This is the simplest solution and provides a consistent procedure/policy across all your users irrespective of their access method (workstation or their own laptop). Select your authentication method such as popup authentication or hold/release queue and enable this option on ALL print queues. The setup procedure for both methods is summarized as follows:

Using Popup Authentication:

1. Select the **Unauthenticated printer** option on all printers
2. Ensure that all workstations have the client software installed. This includes both authenticated lab systems and laptops. The client must be running to have printer access.
3. Instruct users that they will need to enter their username/password in the client when requested.

Using Hold/Release Queue Authentication:

1. Check the **Enable the hold/release queue** option on all print queues. Jobs will not print until a user has authenticated and released the job.
2. Set up release stations, or ensure the **Jobs pending release** option is enabled in the end-user web interface.
3. Instruct users on how to release their jobs. This procedure must be followed by all users.

23.1.5.2. Laptop Only Policy (Advanced)

One problem with the network-wide policy discussed above is that it the authentication method (e.g. client popup or hold/release queue) also applies to authenticated systems. In some ways this is a positive (i.e. provides a consistent policy), while in other ways it can be viewed as an unnecessary on trusted authenticated systems. This section discusses a solution appropriate for larger sites.

The solution is to set up two servers. One server hosts a set of queues for authenticated systems, while the other server provides queues for unauthenticated systems. Network router or firewall rules are used to ensure that only authenticated systems have access to the authenticated queues. Laptops systems must use the other queues. This is best done with partitioned IP address ranges and/or subnets. An experienced network administrator will be able to assist with restricted server access by IP address.

23.1.5.3. Future Plans

The *Laptop Only Policy* is best described as a "hack" and is only suitable for larger sites with good network administrators. In the current release this is a supported solution. The developers do however have some ideas to streamline the setup. These include:

- An ability to "endorse" the authenticated systems so the username is trusted by default. For example, a special file can be copied to these systems (readable only by the root user).
- An IP address range filter restricting systems that can use a given priter.

If you are using this method please take the time to write to the developer team to share your thoughts and ideas.

23.2. Windows hosted print queues

Print-Limit Pro is a multi-user application designed to integrate with an authenticated network. The Macintosh system has a long history. It's grown up from a single-user desktop heritage and is now based on a full multi-user Unix kernel. However, some "single-user-isms" remain, and these can pose challenges for Administrators. One area in particular is remote printer configuration and credential management.

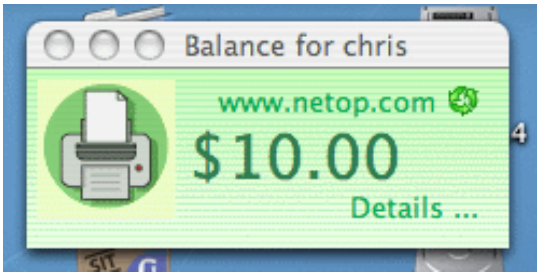


Figure 23.6. Print-Limit Client on Mac OS X

When a network printer, for example a shared Windows printer, is added to a Macintosh system, the **Printer Setup Utility** requests printer access credentials in the form of username and password. Any user that prints to this printer uses these supplied credentials. This means that on the print server, all jobs originating from this Mac system list with supplied username irrespective of who's actually using the Mac.

This chapter discussed some of the multi-user challenges and their solutions.

Macs can be set up to work with Print-Limit Pro in a number of configurations or scenarios. There is no "one best" set up. The ideal solutions will vary from network to network and will depend on factors like:

- Your existing network configuration.
- The mix and makeup of operating systems used on the network.
- The underlying directory technologies (Active Directory, LDAP, etc.) if used.
- Whether Macs are used by a single owner or multiple users.

The following sections outline common set up scenarios and their pros and cons. Your solution may fit one of these scenarios or may be composed of a combination.

23.2.1. Scenario One: My Own Mac (Single User)

Many networks, particularly those in a business environment, have a dedicated desktop system for each user. This allows the desktop system's global settings to be customized for the user. Common examples include:

- Dedicated computers used in a business
- Staff laptops or desktops used in education

23.2.1.1. Requirements

- Printers hosted and shared from a Windows or Linux server.
- Mac systems used by a single user (or small group of known users).
- Each user has a domain account and password.
- The username associated with the account on the Mac matches the domain username (either the account used to login, or the account set up as the automatic log in account).
- Running Mac OS X 10.3 or higher.

23.2.1.2. Installation

Check the user account information:

1. Start up the Mac and ensure the system is connected to the network.
2. From the **Apple Menu** select **System Preferences...**
3. Select **Accounts**
4. Click **MyAccount**.
5. Ensure that the **Short name** associated with the account matches the user's domain account username. If not, create a new working account as appropriate.

Set up the printers that the user requires access to:

1. Open the **Printer Setup Utility** from **Applications -> Utilities**.
2. Click the **Add/+** button to add a new printer.

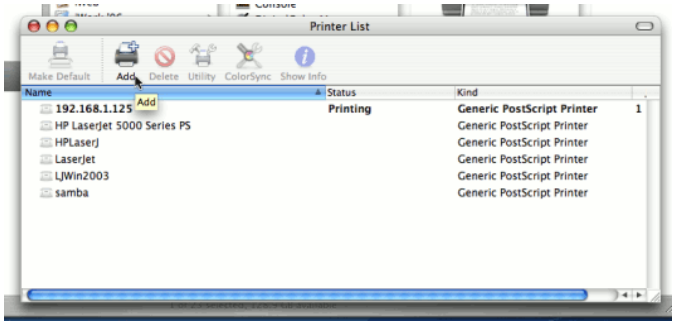


Figure 23.7. Add a printer

3. *10.6 & 10.5:* Control-Click on the Toolbar and select **Customize Toolbar...**. Drag the **Advanced** icon onto the bar. Click the newly added **Advanced** button.

   10.4: Option-Click **More Printers...** (Important: Hold the Option key down) and select **Advanced** from the top drop-down list.

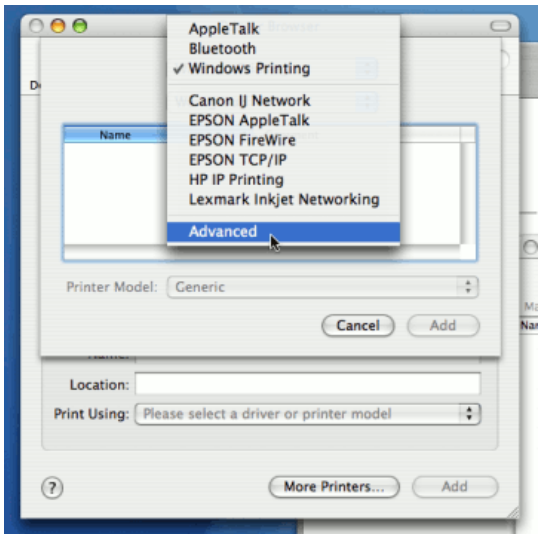


Figure 23.8. Option-click for advanced printer addition types

4. Select the **Windows** device type (called **Windows Printing via Samba** on 10.4).
5. In **Name** field, enter a friendly and informative printer name.
6. Enter a **Device URL** in the form:

```
smb://username:password@server_name/printer_name
```

   Where `username` and `password` are the user's domain account login details. `server_name` is the name of the server hosting the printer, and `printer_name` is the printer's share name. On recent fully patched versions of 10.6 and 10.5 the `username:password@` component can be skipped as the OS will instead prompt for the username and password on first print. Note that OS X can struggle with printer share names containing spaces. If there are problems try a share name without spaces.

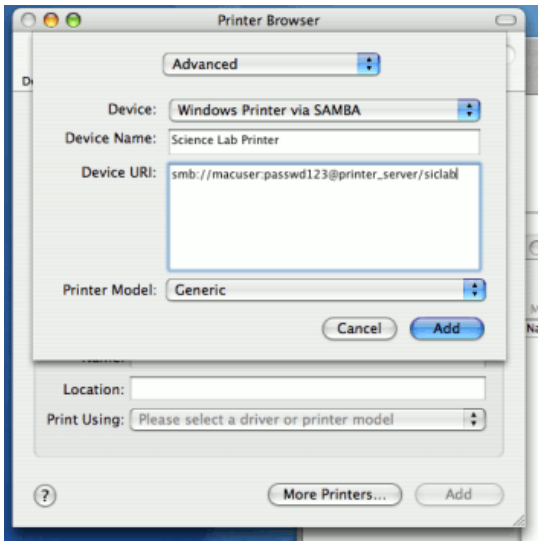


Figure 23.9. Windows printer via Samba

7. Select the **Print Model** to install and configure drivers.

8. Click the **Add** button.
9. Test print and ensure jobs are logged in Print-Limit Pro under the user's network identity.

Tip

Some OS X systems (depending on release and patch level) may display an authentication dialog when printing. The results of this dialog are ignored, because the credentials are already defined in the device URI. Administrators with knowledge of UNIX configuration file management may suppress this dialog by editing the CUPS `/etc/cups/printers.conf` file by removing the `AuthInfoRequired` directive under the `Printer` entry.

To install the Print-Limit Pro client software:

1. Open the **Finder** and select **Go -> Connect to Server...**.

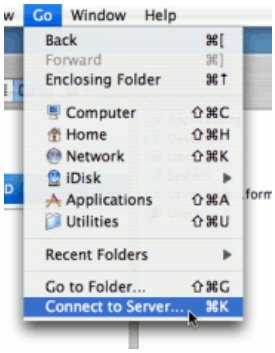


Figure 23.10. Connecting to a Windows server

2. Enter `smb://servername/pcclient` where `servername` is the name of the server hosting Print-Limit Pro.

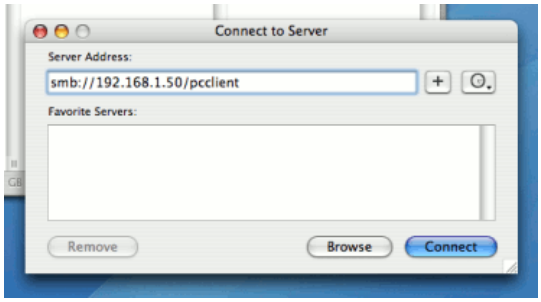


Figure 23.11. The PCClient share's connection string

3. Drag the `PCClient` application across to the local **Applications** directory.
4. Open **System Preferences...** from the **Apple** menu.
5. Select **Accounts**.
6. Click the **Login items** tab.
7. Click the **+** button and select the newly installed `PCClient` application.

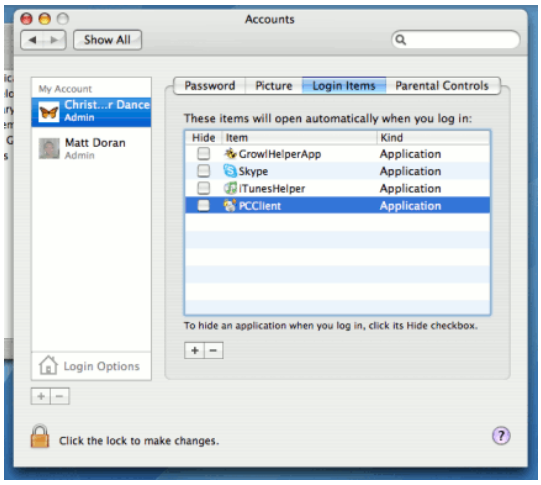


Figure 23.12. Add PCClient as a Login Item

8. Restart the system and ensure the client starts upon login.

23.2.2. Scenario Two: The Multi-User Mac with Popup Authentication

Schools and universities often have Macs available for student use in dedicated computer labs. In these environments the Macs are shared by many users and Scenario One is not appropriate. Larger Mac networks already using LDAP or Active Directory authentication, or planning on doing so, may wish to consider Scenario Three explained in the next section.

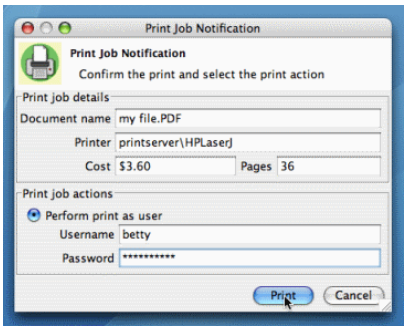


Figure 23.13. Mac popup authentication dialog requesting username and password

Scenario Two uses a popup authentication model. This is discussed in detail in Section 7.10, “Popup Authentication” and discussed further below:

The end-user's perspective:

1. The user sees the client tool (PCClient) running.
2. When the user prints a job, the client pops up a window requesting the user to enter a username and password. See Section 7.10, “Popup Authentication”.
3. The user enters a domain username and password.
4. If the credentials are valid, the job is charged to the user account.

The explanation:

1. The print event is performed as a generic user - for example "`macuser`", "`student`", etc.
2. In Print-Limit Pro, the "macuser" account is set up to use popup authentication by enabling the option **Unauthenticated user**. See Section 7.10, “Popup Authentication” for further details.
3. The popup requests the user to enter a username and password.
4. The password is authenticated and printing is charged against the supplied account.

23.2.2.1. Requirements

- Printers hosted and shared off a Windows, Mac or Linux server.
- Mac systems set up to login under a generic account name. (e.g. macuser, student, etc.)
- The domain contains a user account matching the generic account.

23.2.2.2. Installation

Domain account set up:

1. Log onto the print server or the domain controller.
2. Open **Active Directory Users and Computers** (or equivalent user management tool) from **Start -> Administrative Tools**.
3. Add a new domain user called `macuser`.
4. Define a password for `macuser` and set the password to never expire.

Mac account set up:

1. Start up the Mac and ensure the system is connected to the network.
2. From the **Apple** menu select **System Preferences...**
3. Select **Accounts**.
4. Create an account called `macuser`. Ensure the account's short name is `macuser`.
5. Set this account as the automatic login account, or alternatively make the password known to all users.

Set up the printers that the user requires access to:

1. Open the **Printer Setup Utility** from **Applications -> Utilities**.
2. Click the **Add** button to add a new printer.

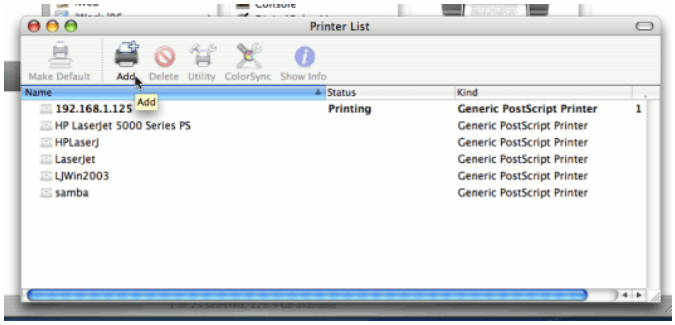


Figure 23.14. Add a printer

3. Option-Click **More Printers...** (Important: Hold the Option key down).
4. *10.6 & 10.5:* Control-Click on the Toolbar and select **Customize Toolbar...**. Drag the **Advanced** icon onto the

bar. Click the newly added **Advanced** button.

10.4: Option-Click **More Printers...** (important: hold the Option key down) and select **Advanced** from the top drop-down list.

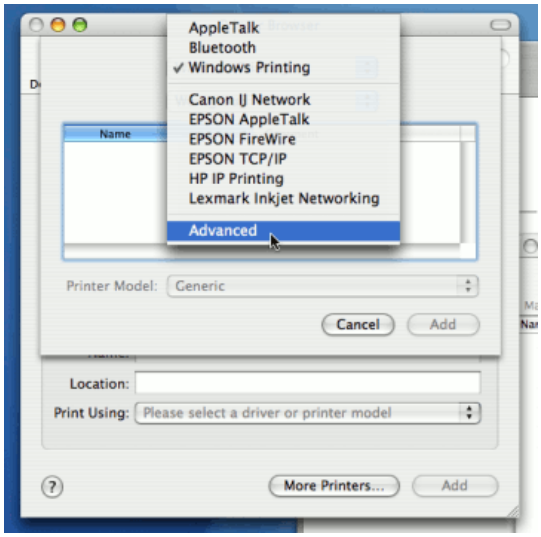


Figure 23.15. Option-click for advanced printer addition types

5. Select the **Windows** device type (called **Windows Printing via Samba** on 10.4).
6. In **Name** field, enter a friendly and informative printer name.
7. Enter a **Device URL** in the form:

```
smb://macuser:password@server_name/printer_name
```

Where `password` is the password for the `macuser` domain account, `server_name` is the name of the server hosting the printer, and `printer_name` is the printer's share name. On recent fully patched versions of 10.6 and 10.5, the `username:password@` component can be skipped as the OS will instead prompt the user for their username and password on first print.

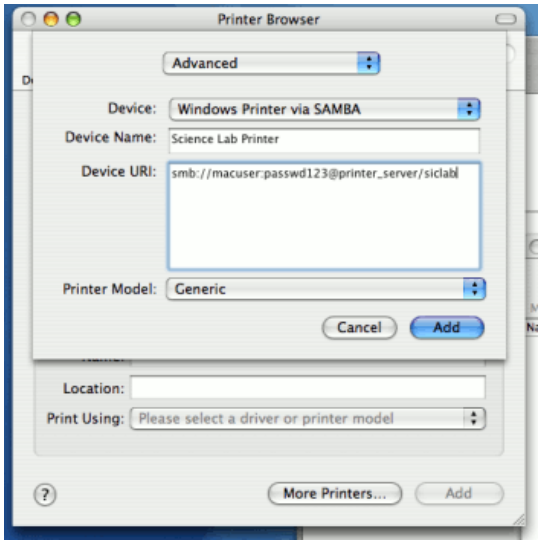


Figure 23.16. Windows printer via SAMBA

8. Select the **Print Model** to install and configure drivers.
9. Click the **Add** button.
10. Test print and ensure jobs are listing in the print queue under the `macuser` identity.

To install the Print-Limit Pro client software:

1. Start and Log into the Mac computer. Ensure it's connected to the network.
2. Open the **Finder**.
3. From the **Go** menu, select **Connect to Server...**

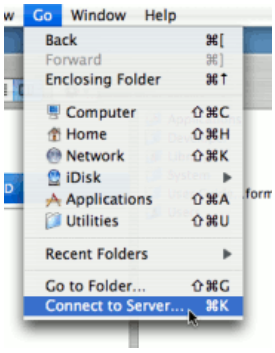


Figure 23.17. Connecting to a Windows server

4. Enter the pcclient share's connection details like:

```
smb://server_name/pcclient
```

   Where `server_name` is the name of the server hosting the Print-Limit Pro server software.

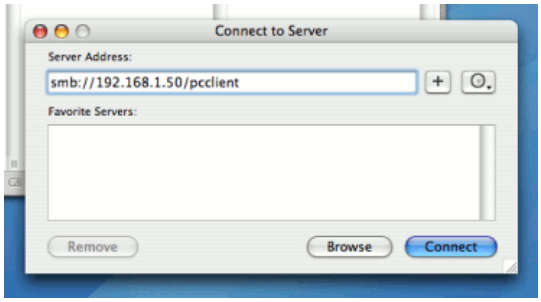


Figure 23.18. The PCClient share's connection string

5. Enter password information if requested.
6. Drag the `PCClient` package over to the local hard disk's global **Applications** folder. The copy process will commence.

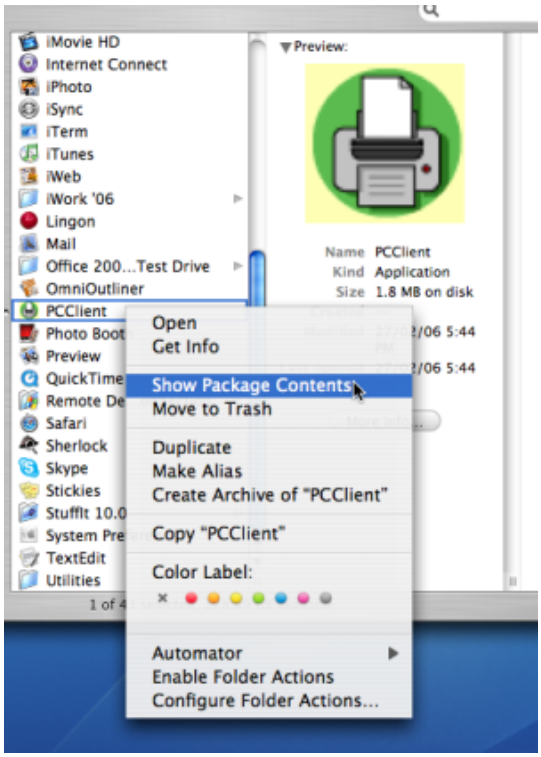


Figure 23.19. Command-click and open the package

7. Command-click on the newly copied `PCClient` application in the **Applications** directory. Select **Open Package Contents**.
8. Navigate to `Contents/Resources/`.
9. Double-click on the `install-login-hook.command` script.

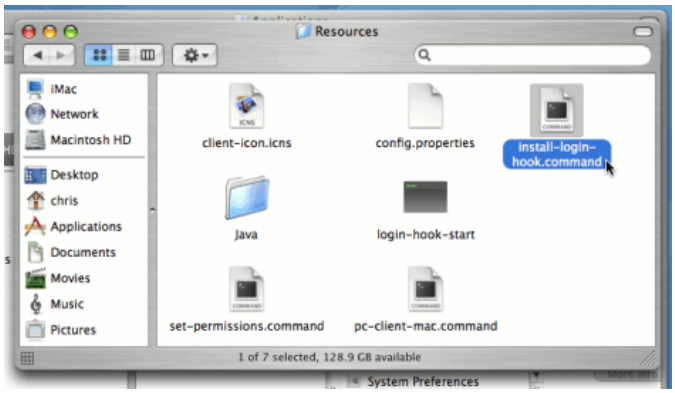


Figure 23.20. Double-click to install the login hook

10. Restart the system and verify the client starts on login.

Configure the popup settings:

1. Log on to Print-Limit Pro's administration interface as built-in `admin` user.
2. Select the `macuser` account from **Users**.

3. On the `macuser`'s details screen, set the account balance to zero.
4. Ensure the user is set to **Restricted**.
5. Check the **Unauthenticated** option and save the changes.

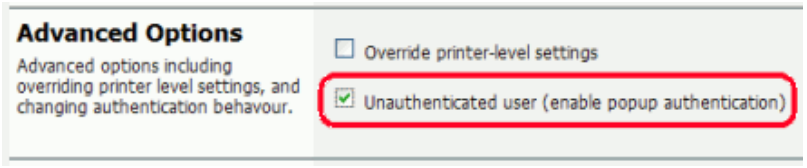

Advanced Options
Advanced options including overriding printer level settings, and changing authentication behavour.
Override printer-level settings
Unauthenticated user (enable popup authentication)

Figure 23.21. Turning on popup authentication at the user level

6. Click the **Apply** button to save the changes.

Tip

If users login to the Mac using their AD/LDAP username then it's possible to eliminate the authentication popup by configuring the client as described in Section 23.3, “Eliminating PopUp Authentication via Mac Login Hook”.

Testing:

1. Log on to a Mac. Verify that the `PCClient` program starts automatically.
2. Print to the newly set up printer. On the server's print queue the job appears under the user identity of `macuser`.
3. The popup should display on the Mac. Enter a valid domain username and password.

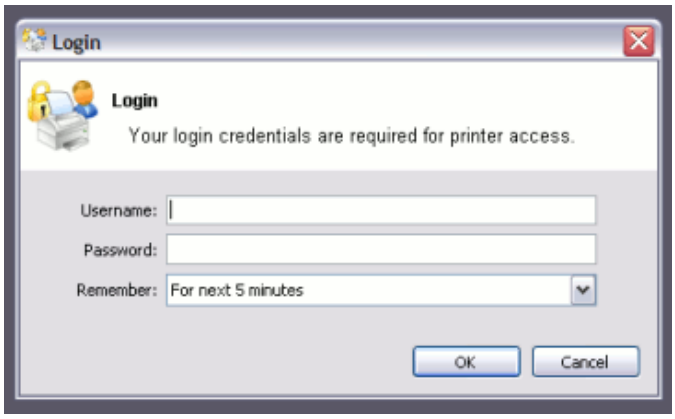


Figure 23.22. Print-Limit Pro client requesting for authentication (Sorry: Windows screen-shot!)

4. The corresponding user should be charged for the job.

23.2.3. Scenario Three: Multi-user Macs using LDAP or Active Directory authentication

Larger networks often run the Macs in a domain environment either authenticating with an Active Directory or an LDAP network. In an authenticated domain environment, the identity of the user (the user's username) is known and verified at the time of login. With the help of the TCP/IP Printing Services for Microsoft Windows, and the LPR/LPD support on the Mac, print jobs can be identified on the server and associated with the user's login name. This avoids the need for the popup authentication used in Scenario Two.

23.2.3.1. Requirements

- Macs set up in multi-user mode authenticating off a domain. Either Active Directory or LDAP.
- Printers hosted on a Windows print server.
- The server needs the TCP Printing Services installed (also known as Print Services for Unix).

23.2.3.2. Installation

On the server hosting the printers, setup TCP/IP Printing:

1. Log into the server as a system `administrator`.
2. Select **Control Panel** → **Add Remove Programs**.
3. Click on **Add/Remove Windows Components**.
4. Select **Other Network File and Print Services**

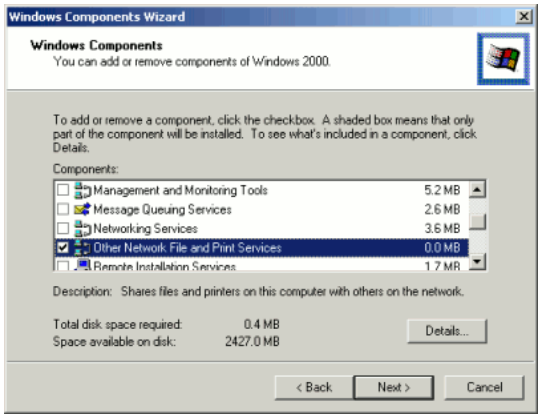

Windows Components Wizard
Windows Components
You can add or remove components of Windows 2000.
To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.
Components:
Management and Monitoring Tools 5.2 MB
Message Queuing Services 2.6 MB
Networking Services 3.6 MB
Other Network File and Print Services 0.0 MB
Remote Installation Services 1.7 MB
Description: Shares files and printers on this computer with others on the network.
Total disk space required: 0.4 MB
Space available on disk: 2427.0 MB
Details...
< Back
Next >
Cancel

Figure 23.23. Windows Component: Other Network File and Print Service

5. Click **Details...** and ensure **Print Services for Unix** is selected.
6. Click **Next** to complete the installation.

Tip

Some systems running firewall software may block LPD printing. On systems running firewall software, ensure that incoming connections from the local network are allowed on port 515.

On each Mac, add the required printers:

1. Open the **Printer Setup Utility** from **Applications -> Utilities**.
2. Click the **Add** button to add a new printer.

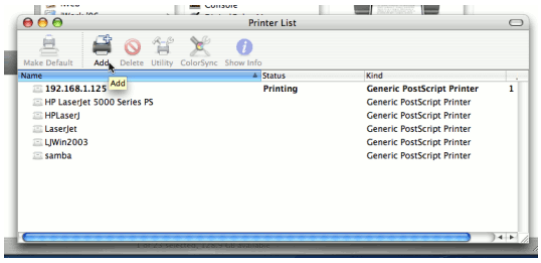


Figure 23.24. Add a printer

3. Click the **IP Printing** button at the top toolbar.
4. From the **Protocol** dropdown, select **Line Printer Daemon - LPD**.
5. Enter the IP address of the server hosting the printers in the **Address** field.
6. Enter the printer's share name in the **Queue** field.

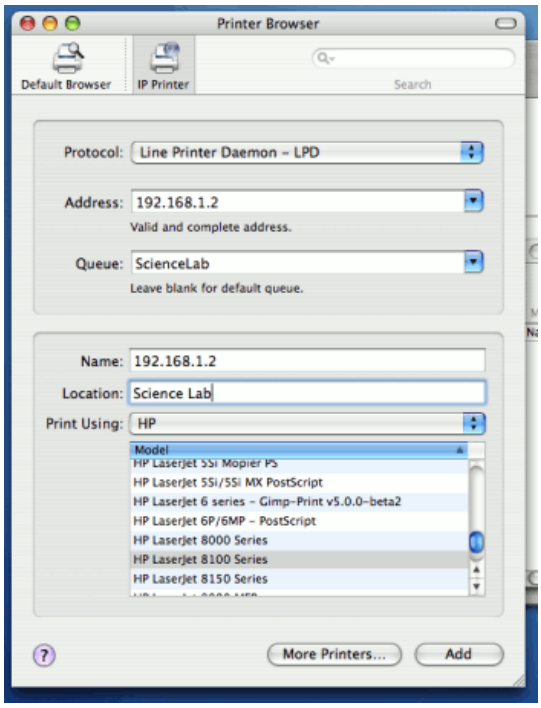


Figure 23.25. Adding an LPR/LPD printer

7. Define a user friendly name in the **Name** field and select the printer type.
8. Click the **Add** button.
9. Repeat for other printers as necessary.

To install the Print-Limit Pro client software:

1. Open the **Finder**.
2. From the **Go** menu, select **Connect to Server...**

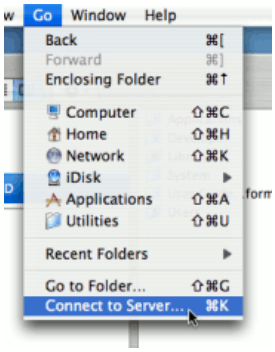


Figure 23.26. Connecting to a Windows server

3. Enter the pcclient share's connection details like:

```
smb://server_name/pcclient
```

   Where `server_name` is the name of the server hosting the Print-Limit Pro server software.

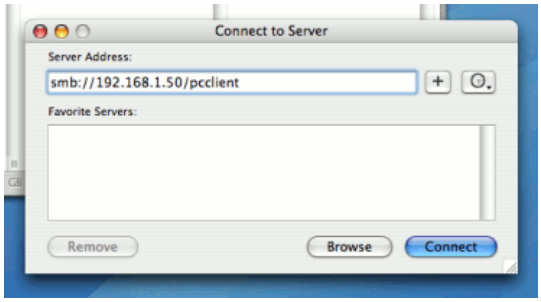


Figure 23.27. The PCClient share's connection string

4. Enter password information if requested.
5. Drag the `PCClient` package over to the local hard disk's global **Applications** folder. The copy process will commence.
6. Control-click on the newly copied `PCClient` application in the **Applications** directory. Select **Show Package Contents**.
7. Browse to `Contents/Resources/`.
8. Double-click on the `install-login-hook.command` script.

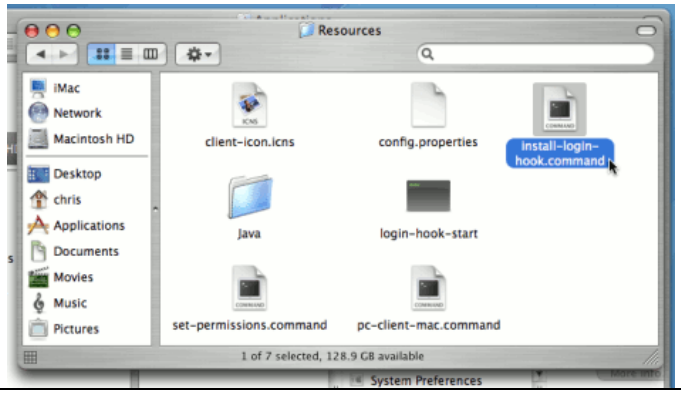


Figure 23.28. Double-click to install the login hook

9. Restart the system and verify the client starts on login.

Testing:

1. Restart the system and ensure the client starts on login and lists the user's account balance.
2. Ensure print jobs correctly account under the user's Print-Limit Pro account.

23.2.4. Scenario Four: Mac OS X Server

If the printers used by Mac clients are hosted/shared from a Mac server system (or Mac workstation system acting as a server), then the preferred solution is to install Print-Limit Pro's Mac server software. The Mac server may either be set up as the primary server or as a secondary server reporting back to an existing primary server.

The Macintosh server support and initial setup is documented in Section 2.2, “Installation on Apple Mac”.

23.2.5. Additional information and tips

The client install process is also covered in Section 5.2, “User Client”. After the first Mac is set up and the printing process is tested, the simplified client install notes covered in Section 5.2.1.2, “Deployment on Mac OS X” may be appropriate to provider to end-users or other system administrators.

The Mac client makes use of Java. Users running Mac OS X 10.4 are advised to install Java 5.0. Java 5.0 is installed by default on Mac OS X 10.4.5 and higher. Java 5.0 for earlier Mac OS versions is available as a `dmg` from the Apple website. Java 5.0 contains new features that allow the client to display popups in an always-on-top mode above all other application windows.

Mac client can accept command line options as explained at Table A.2, “User Client command-line options”. If the client is started via the login hook, the command-line options can be defined in the file:

```
/Applications/PCClient.app/Contents/Resources/login-hook-start
```

Look for the line starting with `client_args` and the associated comments above.

23.3. Eliminating PopUp Authentication via Mac Login Hook

In large mixed Mac environments there may be the requirement to use popup authentication to provide a secure environment. For example, there may be a mix of lab systems and unauthenticated laptops. The lab systems are managed and secured via authentication against a central user directory source, while the unmanaged systems (e.g. laptops) are limited to local user authentication only and hence user identity is indeterminate. Popup authentication at the print queue level can be used to provide an added level of user verification. The downside to this is that this policy also affects the managed authenticated lab systems. This can frustrate users as they are forced to login twice: Once for system login and then once for printing (via Print-Limit). This double authentication can be eliminated by leveraging the lab system's login hook.

This is an advanced topic and is targeted at experienced Mac administrators with basic command-line knowledge.

The double-authentication is eliminated by having the *system login* also perform the *Print-Limit login* via the system login hook. After the administrator has confirmed that the workstation is securely authenticating via a the central directory service, they endorsed the system by copying a *shared secret* file onto the workstation. To perform this endorsement, follow these steps:

1. Setup the Print-Limit client on the workstation and configure it to start via the login hook as explained in detail here Section 5.2.1.2.2, “Multi-User Install”.
2. Use a secure method (e.g. USB key or `scp`) to copy the file located on the Print-Limit primary server at:

```
[app-path]/server/data/pc-shared-secret.dat
```

to the workstation in either of the following locations:

```
/etc/pc-shared-secret.dat
  or
/Library/PCClient/pc-shared-secret.dat
```

3. Set ownership and permissions on the file via the command line as follows:

```
sudo chown root /etc/pc-shared-secret.dat
sudo chmod 600 /etc/pc-shared-secret.dat
```

Take care to ensure this step is completed successfully.

4. Test login and verify that Print-Limit popup authentication step has been eliminated by printing to a unauthenticated printer. Confirm that the job prints and logs as expected.
5. Repeat steps above for each trusted directory authenticated system (e.g. lab system) on the network, or use system imaging processes.

Chapter 24. Running in a Workgroup Environment

A workgroup environment differs from a network domain model. In the domain model, users authenticate using a common username/password as defined in a central server. Users can typically access and use any PC on the network by using their username and password. In a workgroup, the PC's are loosely coupled and user identity is validated locally rather than centrally. The PC's are either set up to automatically log in as a general "user", or user accounts are set up on the PC's as required.

For systems running Windows XP Home, 'simple file sharing' cannot be disabled, forcing client machines to try to authenticate as the Guest user. For this reason, we do not recommend the use of Windows XP Home in multi-user environments.

Users may still authenticate with Print-Limit Pro on Windows XP Home by entering their details into the User Client utility. This is similar to how user authentication is performed with Mac clients. For more information see Section 24.2, “Option 2: Authenticating via popup”.

Print-Limit Pro offers a number of options for running and authenticating users in a workgroup. The two common options are:

24.1. Option 1: Common username and passwords on all systems

This option is suitable for networks running Windows 2000 or Windows XP Pro.

1. Nominate a system to host the printers and the Print-Limit Pro server software.
2. Set up the printers and share with appropriate names.
3. Windows XP only: Turn off simple file sharing by opening Windows Explorer, select **Tools** → **Folder Options...**, and un-ticking the appropriate option on the **View** tab.

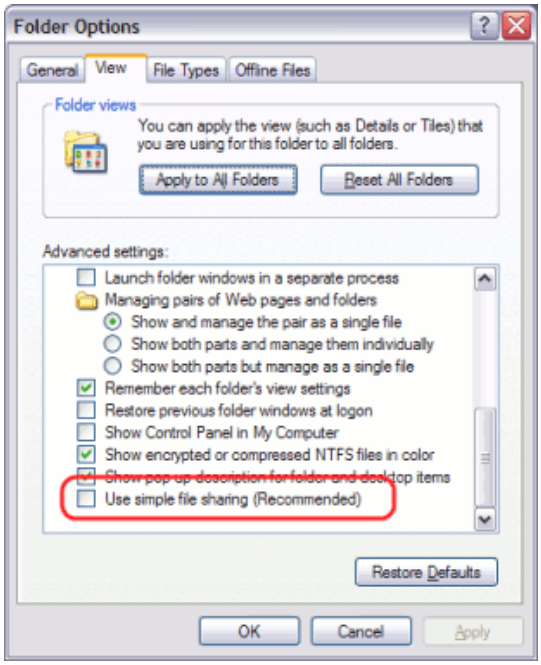

Folder Options
General
View
File Types
Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Launch folder windows in a separate process
Managing pairs of Web pages and folders
Show and manage the pair as a single file
Show both parts and manage them individually
Show both parts but manage as a single file
Remember each folder's view settings
Restore previous folder windows at logon
Show Control Panel in My Computer
Show encrypted or compressed NTFS files in color
Use simple file sharing (Recommended)
Restore Defaults
OK
Cancel
Apply

Figure 24.1. Turn off simple file sharing

4. On the nominated host system, ensure that the `Guest` account is disabled. To do this on a system running

Windows XP:

a. Open the `Local Users` screen: **Start** → **Control Panel** → **Administrative Tools** → **Computer Management** → **Local Users and Groups** → **Users**

b. Right-click on the `Guest` user and select Properties.

c. On the **General** tab, check **Account is disabled**.

d. Press the **OK** button.

This should also be performed for any system running a release station.

5. On the nominated host system, set up user accounts for all users. This can be done via under **User Accounts** in the **Windows Control Panel**.
6. Set permission on the printer so only these users can access the printer shares (i.e. don't allow guest).
7. Install the Print-Limit Pro server software and complete the configuration wizard.
8. Instruct each user to log onto their workstation using an account with the same username and password as set up for them on the nominated host system. This will ensure that their jobs list in the queue under their username.

24.2. Option 2: Authenticating via popup

Option 1 may not be appropriate for some environments. For example, Windows XP Home edition has a limitation that ensures that all users list as "guest" when printing to a remote printer. This limitation can be worked around with popup authentication.

1. Nominate a system to host the printers and the Print-Limit Pro server software.
2. Windows XP only: Turn off simple file sharing by opening Windows Explorer, select **Tools** → **Folder Options...**, and un-ticking the appropriate option on the **View** tab.

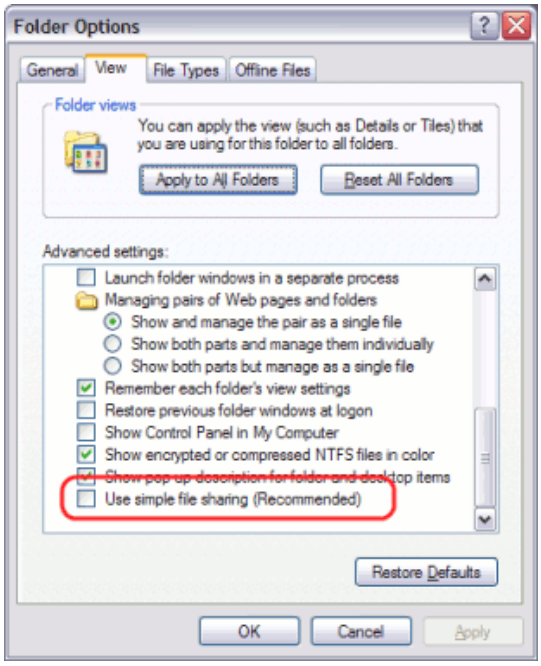

Folder Options
General
View
File Types
Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Launch folder windows in a separate process
Managing pairs of Web pages and folders
Show and manage the pair as a single file
Show both parts and manage them individually
Show both parts but manage as a single file
Remember each folder's view settings
Restore previous folder windows at logon
Show Control Panel in My Computer
Show encrypted or compressed NTFS files in color
Use simple file sharing (Recommended)
Restore Defaults
OK
Cancel
Apply

Figure 24.2. Turn off simple file sharing

3. On the nominated host system, ensure that the `Guest` account is disabled. To do this on a system running Windows XP:

a. Open the `Local Users` screen: **Start** → **Control Panel** → **Administrative Tools** → **Computer Management** → **Local Users and Groups** → **Users**

b. Right-click on the `Guest` user and select Properties.

c. On the **General** tab, check **Account is disabled**.

d. Press the **OK** button.

This should also be performed for any system running a release station.

4. On the nominated system, set up user accounts for all users.
5. Install the Print-Limit Pro server software and complete the configuration wizard.
6. Print from another workstation. The job should list in Print-Limit Pro under the user "guest".
7. In the Print-Limit Pro admin interface, enable the **account selection popup** and turn off the **Allow user to charge to their personal account** option and enable the **Allow user to perform printing as another user**.

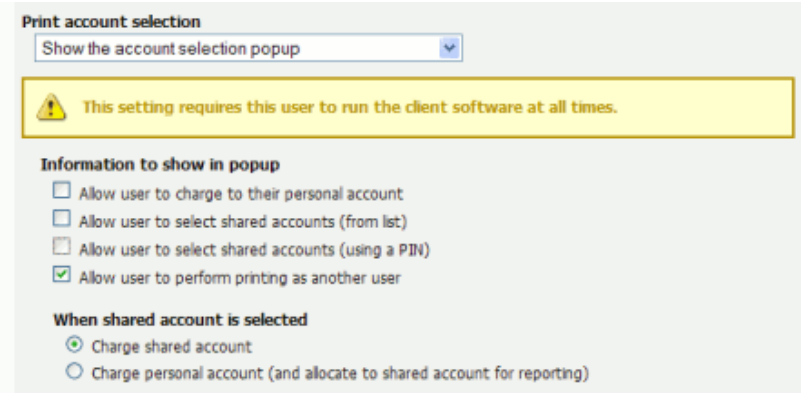

Print account selection
Show the account selection popup
This setting requires this user to run the client software at all times.
Information to show in popup
Allow user to charge to their personal account
Allow user to select shared accounts (from list)
Allow user to select shared accounts (using a PIN)
Allow user to perform printing as another user
When shared account is selected
Charge shared account
Charge personal account (and allocate to shared account for reporting)

Figure 24.3. Enable perform printing as other user

8. Install the client software on each workstation. See Section 5.2, “User Client”.
9. When the user prints to the shared printer, a popup will now ask users to enter their username and password.

Chapter 25. Managing Guests and Internal Users

Print-Limit Pro is designed to keep user management simple and automated by synchronizing against an external user directory source such as Active Directory, Open Directory, eDirectory or LDAP. This simplifies administration of the system by avoiding the need to manage a separate database of users, passwords, user details and groups. Synchronizing against a user directory is the recommended way to manage user accounts, and ensures:

- The tool is right for the job. User directories are specifically designed for managing users, and can provide a wide range of useful features. It also allows for "single sign-on", allowing users to log in with the same username and password across many different applications.
- Scalability and centralization of user management. Many applications may access the same user directory, so the effort to set up users only needs to be performed once, rather than once for each application.
- Application vendor neutrality. Switching to a different application is possible, because the users are not 'locked in' to any particular application.

The first option should always be to manage users in a user directory, but there are some situations where this is not possible or not ideal, for example:

- When a guest visits the organization they may require access to network resources, but it requires too much effort to create them an account in the user directory. (They may receive a temporary / generic login instead.)
- Some parts of the organization want to manage their own set of users that cannot or should not be created in the main user directory. For example a university may run a short course where the students only require limited or sporadic access to network resources. They will not have accounts in the user directory, but still require the ability to print.
- The organization does not have enough users to warrant a user directory / domain (i.e. a workgroup or peer-to-peer environment is in place).

For these situations, Print-Limit Pro provides the *internal users* feature. The following section discusses how to get started with the internal users feature, and how to configure it to suit your environment. Internal users are best thought of as user accounts that only exist inside Print-Limit Pro and are independent of the domain, network or operating system.

25.1. Internal Users (users managed by Print-Limit Pro)

The *internal users* feature allows management of users inside Print-Limit Pro, removing the need to create or manage them in an external user directory. There are several ways the feature can be utilized:

- Selected staff can be given access to create internal user accounts. This gives staff control over who can receive a new account, preventing the creation of unwanted accounts (e.g. with offensive usernames).
- Users can be given the ability to create their own internal accounts via a web based registration form. This can be useful for providing guests the ability to register their own accounts and begin printing immediately, removing the need for staff intervention.
- Administrators can create a new batch of internal users via a text based file import. This can be used to import or update a set of users that are managed separately to the regular domain users. For more information about the internal users batch import and update feature, see Section 25.1.4, “Batch Internal User Import and Update”.

The following sections present several different environments and how the internal users feature can be used to accommodate them. For information about specific configuration, Section 25.1.2, “Internal Users Options” provides full details about each available option.

25.1.1. Implementation by Example

25.1.1.1. Scenario One: Manually Managed Guest Accounts

North Shore University has a campus that occasionally hosts students from other universities. These guest students do not have a login in the universities domain, and it is considered too much effort to go through "official channels" to create one for them.

The administrator would like to provide selected staff the ability to create Print-Limit Pro accounts for these guest students as needed. To go about this, the administrator performs the following:

1. The guest students are first provided with access to computers or network resources using the generic login `guest`, password `guest`.
2. The generic `guest` login is marked as **Unauthenticated** using the Print-Limit Pro administration interface. This option is available on the user's details page.
3. Navigates to **Options** → **User/Group Sync** → **Internal User Options**.
4. Checks the **Enable internal users** option, and under **Access control** selects **Only admins can create users**.
5. The **Confirmation message** is tailored to provide relevant information such as how to log in.
6. Presses **Apply**.
7. Print-Limit Pro administrator access is assigned to the staff who will be responsible for creating the new student guest accounts. The administrator right **Create internal users** is required for this purpose. For more information about assigning administrator rights see Section 12.4, “Assigning Administrator Level Access”.
8. Ensures that the Print-Limit Pro client software is running on workstations where guest printing will be allowed.

The system is now configured to allow selected staff the ability to create internal accounts for the guest students. When a guest student prints from the generic `guest` login, the Print-Limit Pro client tool will display the *authentication popup*. This will allow them to enter their personal username and password, assigned by the administrator when registering their internal user account.

Staff can create an internal user account for a guest student as follows:

1. Log into the Print-Limit Pro administration interface, and select the **Create internal user...** action from the **Actions** menu of the **Users** tab.
2. Complete the from and press **Register**.

25.1.1.2. Scenario Two: Automated Guest Management (self-registration)

West Face College is a large community college that regularly has members of the public visiting to use the library resources.

It is not feasible to create a domain login for every visitor, and manually creating an internal user account for each guest would require too much time of the administrators or staff, so the decision is made to automate the process and allow guests to register their own internal user accounts.

To set up the internal users feature and allow guest self-registration, the administrator performs the following:

1. The guests are first provided with access to computers or network resources using the generic login `guest`, password `guest`.
2. The generic `guest` login is marked as **Unauthenticated** using the Print-Limit Pro administration interface. This option is available on the user's details page.
3. Navigates to **Options** → **User/Group Sync** → **Internal User Options**.
4. Checks the **Enable internal users** option, and under **Access control** selects **Users can register their own account**.
5. Checks **Display registration links on login screens** so that users will have easy access to the registration interface.
6. Changes the **Link text** to `Guests click here to register`, to provide a better clue for guests.

7. Adds more information about the organization's printing policy, how to access printing resources, etc. under **Additional registration instructions**. A note is also added to specify that only guests need to register to access printing resources - students or users with existing accounts do not need to register.
8. Presses **Apply**.
9. Ensure that the Print-Limit Pro client software is running on workstations where guest printing will be allowed.
10. Creates an information sheet for guests, providing instructions about how to register, how to print, and where to find additional help. Most people will not need this kind of information to work out how to use the system for themselves, but some people appreciate step-by-step instructions.

The system is now configured to allow guests to register their own internal user accounts. When a guest user prints from the generic `guest` login, the Print-Limit Pro client tool will display the *authentication popup*. This will allow them to enter their personal username and password, chosen when registering their internal user account.

For a guest to create an internal user account, they must:

1. Click the **Register as a New User** link on a login screen (the web interface login screen, or on the authentication popup), or access the registration web interface directly at `http://[server-name]:9191/register`.
2. Complete the from and press **Register**.

25.1.1.3. Scenario Three: Managing Users in a Non-Domain Environment

Southmark Inc. is a medium sized ten person real estate office service the local area. Their network consists of a mix of Windows XP and Windows Vista workstations connected to a workgroup based network. No user directory / domain exists, and setting one up is not a current priority. They would like to take control of their printing costs and volumes, and use Print-Limit Pro to identify the amount of printing performed by each staff member.

Because no user directory exists, Print-Limit Pro will be used to maintain user accounts, details and passwords for all staff. To set this up, the administrator performs the following:

1. Navigates to **Options** → **User/Group Sync** → **Internal User Options** in the Print-Limit Pro administration interface.
2. Ensures that the **Enable internal users** option is enabled.
3. Removes (sets to blank) the value for **Prefix usernames with:**. There is no need for an internal username prefix, because all users will be internal!
4. Collects a chosen username and password from each staff member. This is used to construct a batch import file, using the format specified in Section 25.1.4.1, “Batch Internal User Import File Format”.
5. Imports the batch file into Print-Limit Pro using server-command to create a new internal user account for each staff member, following the directions in Section 25.1.4, “Batch Internal User Import and Update”.
6. Follows the directions in Section 5.2.1, “User Client Deployment” to deploy the client software to each workstation in the office.
7. When staff send print jobs from their workstations, they arrive at the print server under the generic `guest` username. The administrator marks this generic account as **Unauthenticated** using the Print-Limit Pro administration interface. This option is available on the user's details page.

The batch of internal user accounts has now been imported, ready for the staff to use them. When a staff member next sends a print job, the Print-Limit Pro client tool will display the *authentication popup*. This will allow them to enter their personal username and password, provided to them on arrival, having been assigned by the administrator in the batch import file.

25.1.2. Internal Users Options

The options for configuring internal users are located at **Options** → **User/Group Sync** → **Internal User Options** in the administration interface.

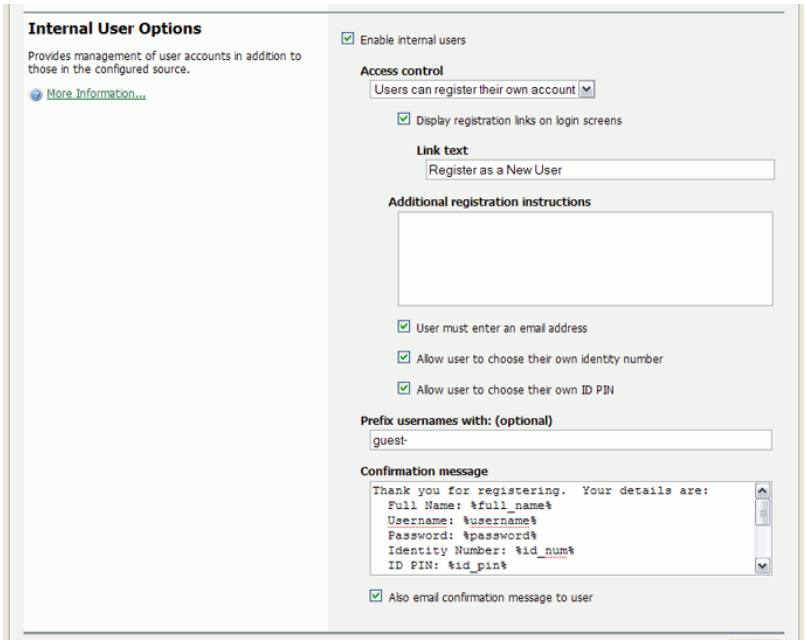

Internal User Options
Provides management of user accounts in addition to those in the configured source.
More Information...
Enable internal users
Access control
Users can register their own account
Display registration links on login screens
Link text
Register as a New User
Additional registration instructions
User must enter an email address
Allow user to choose their own identity number
Allow user to choose their own ID PIN
Prefix usernames with: (optional)
guest-
Confirmation message
Thank you for registering. Your details are:
Full Name: %full_name%
Username: %username%
Password: %password%
Identity Number: %id_num%
ID PIN: %id_pin%
Also email confirmation message to user

Figure 25.1. Internal users options

The available options are:

- **Enable internal users** - enables or disables the feature in general. If the feature is disabled, internal users will not be able to be created.
- **Access control** - determines who may create internal users. The available options are:
  - **Users can register their own account** - A web based interface will be available for users to register their own account. This allows users to register their own accounts without intervention from staff or administrators.
  - **Only admins can create users** - Only administrators will be able to create users via the Print-Limit Pro administration interface. For information about delegating this access to additional users see Section 12.4, “Assigning Administrator Level Access”.

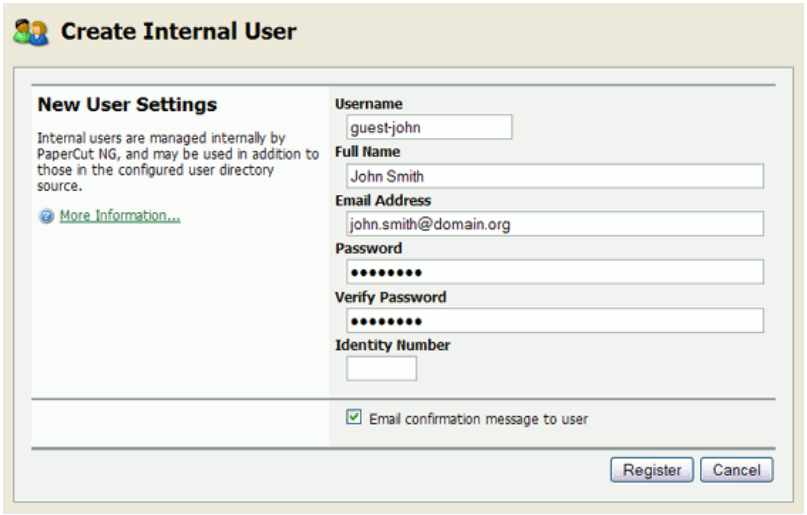


Figure 25.2. Creating an internal user from the administration interface

- **Display registration links on login screens** - When enabled, Print-Limit Pro login screens will display a **Register as a New User** link. Clicking this link takes the user to the web based registration interface, allowing the user to create their own internal user account. If disabled, registration links will not appear, and users may only access the web based registration interface by navigating to the URL at `http://[server-name]/register`.
- **Link text** - The text used for registration links on login screens. The default link text is `Register as a New User`. An example of alternate link text might be `Guests click here to register`.
- **Additional registration instructions** - This option allows providing additional instructions to users when registering, and are displayed above the web based registration form. Specific instructions will vary from site to site, but could include information such as how to log in and print, how to add credit to their account, or where to find additional help.
- **User must enter an email address** - Enable this option to require that the user enters an email address. If disabled, entering an email address is optional.
- **Allow user to choose their own identity number** - If enabled, the user will be able to enter/choose their own identity number. The chosen identity number must be at least 6 digits, and must be unique. If disabled, a unique identity number will be automatically generated for the user. Identity numbers may be used for logging into some devices where only a numeric keypad is available.
- **Allow user to choose their own ID PIN** - If enabled, the user will be able to enter/choose their own ID PIN. The chosen PIN must be at least 4 digits. If disabled, a random PIN will be automatically generated for the user.
- **Prefix usernames with: (optional)** - This prefix will be applied to the username of all users registering via the web based interface. E.g. if a user chooses the name `john`, and the username prefix is `guest-`, their allocated username will be `guest-john`. This prevents name clashes with existing or future users from the configured user/group sync source, and immediately identifies the user as being internal.
- **Confirmation message** - This message is displayed to the user after they have completed registration. It may also be emailed to the user (see next option).
- **Also email confirmation message to user** - If this option is enabled the confirmation message will be emailed to the user after registration (if an email address was provided).

Tip

- An alternative to the Print-Limit Pro client tool's authentication popup is to use a print release station in `Release Any` mode. After ensuring that guest users have their own internal account, this will allow users to submit a print job under a guest/generic login, then authenticate at the release station and choose which job(s) they would like to release. For more information about setting up a release station see Chapter 10, *Hold/Release Queues & Print Release Stations*.
- To delete an internal user, navigate to their **User Details** page in the administration interface by clicking on the user in the **User List**, then select the **Delete user** item from the **Actions** list. The domain/network-level User and Group Synchronization settings and opperations do not affect and will not delete internal users.
- The special `[Internal Users]` group contains all internal users. It can be used to produce reports showing information about internal users, or to apply a *bulk user operation* on all internal users.

25.1.3. Changing Internal User Passwords

When using the Internal User functionality of Print-Limit Pro, there may be a need for the Internal User to change their password. This can be done by users and administrators.

- Administrators can reset the password via the users details page in the Print-Limit Pro Application Server Administration Console. There is a "Change Password Link" located near the Internal User Settings heading.

Internal User Settings
The password for this internal user can be changed here.
This is an internally managed
Change Password

Figure 25.3. Changing an internal user password from the administration interface

- The Internal User can reset their password via the User Web pages by clicking on Change Details.

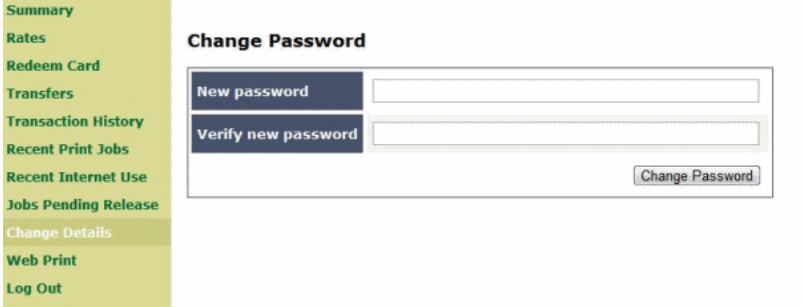


Figure 25.4. Changing an internal user password from the user web page

Tip

Administrators can turn on or off the ability for Internal Users to change their password by using the Config Editor and modifying the key: `internal-users.user-can-change-password`

25.1.4. Batch Internal User Import and Update

This section covers the batch importing and updating of *internal users*. Internal users are managed internally by Print-Limit Pro, and may be used in addition to those in the configured user directory source. For more information about internal users see Section 25.1, “Internal Users (users managed by Print-Limit Pro)”. For information about importing and updating regular users see Section 6.6, “Batch User Data Import and Update”.

The batch internal user import and update feature allows the administrator to import users, user information and optionally update existing internal user details by reading data from a simple text file. In addition to being able to create internal users, it enables administrators to update the following user data:

- Password
- Credit balance
- Restriction status
- Full name
- Email address
- Department
- Office
- Card/ID Number
- Card/ID PIN
- Notes

Important

An internal user can be deleted by selecting the **Delete user** action while viewing the user. Features to simplify the deletion of multiple users (a 'batch delete') will be introduced in a future version.

Examples of where the batch user import feature is useful include:

- Several guests to the organization will be arriving at the same time and will require their own accounts in Print-Limit Pro.
- A set of users needs to be managed separately / externally to the existing user directory source. For example, the users of a certain computer lab require their own accounts in Print-Limit Pro, but it is not possible to create accounts for them in the existing user directory.
- Details for existing internal users needs to be updated.

To perform a batch internal user import:

1. Manually inspect your file in a text editor and ensure it's in the prescribed tab-delimited format as detailed at Section 25.1.4.1, “Batch Internal User Import File Format”.
2. Follow the directions in Section A.1, “Server Commands (server-command)” to run the server-command `batch-import-internal-users`.

   For example, to import/update internal users from a file `import.tsv` on a Windows system:

   ```
   C:\> cd "C:\Program Files\Print-Limit Pro\server\bin\win"
   server-command batch-import-internal-users "C:\extra users\import.tsv"
   ```

   Note that the import path should be quoted if it contains spaces.
3. The import process will start running in the background. See the **App. Log** tab in the administration interface to check the status of the import or if any errors were encountered.

Caution

Batch imports are a major operation, modifying data en masse. Best practice suggests:

- Always run a backup *before* proceeding with the import.
- First experiment/test the import process with a small batch of users before moving onto the full batch.

25.1.4.1. Batch Internal User Import File Format

The import file is in tab delimited format and contains the following fields in the given order:

No.	Field	Description	Optional?
1.	Username	The internal user's username. If the policy is to use a username prefix for internal users, include the prefix here (e.g. `guest-user123`).	Mandatory
2.	Password	The user's password	Optional - although internal users cannot log in without a password
3.	Credit Balance	The user's credit balance	Optional - balance not set if blank

No.	Field	Description	Optional?
4.	Restricted Status	The user's restricted status. (Y/N)	Optional - restricted status not set if blank
5.	Full Name	The user's full name	Optional - full name not set if blank
6.	Email	The user's email address	Optional - email not set if blank
7.	Department	The user's department or faculty	Optional - department not set if blank
8.	Office	The user's office or location	Optional - office not set if blank
9.	Card/ID Number	The user's identity/card number	Optional - card/id number not set if blank
10.	Card/ID PIN	The user's card PIN number	Optional - card/id PIN not set if blank. If the field is '-' then the PIN is set to zero.
11.	Notes	Notes about the user.	Optional - notes not set if blank

Table 25.1. Internal User Import File Format

Other limitations: Although any actual limit to the size of an import file should be large enough for any purpose, we recommend keeping the file size below 10MB.

Tip

- If an optional field is not specified in the import file then it will not be updated. To remove or "blank out" an existing value, use a single "-" (hyphen / dash).
- A simple way to create a tab delimited file is to create a spreadsheet in Microsoft Excel, then save it in the `Text (Tab delimited)` format.

For some examples of using tab-delimited files, see Section 6.6.1.1, “Import File Format Examples”.

Chapter 26. Multiple Personal Accounts

Users in Print-Limit have a personal balance used to fund their personal printing. This balance can be treated like a bank account used for printing. When the account is out of credit the user can no longer print until more funds are added to the account. By default users have a *single account* to store their balance, but this may be too restrictive in some situations. For example, it's often useful to have separate accounts for "free" print quotas and cash payments.

The *multiple personal accounts* feature discussed in this chapter is an advanced feature that has been carefully architected with the assistance and feedback from leading Universities and Colleges from around the globe.

When *multiple personal accounts* are enabled, a user has multiple accounts with credit available for printing. Each account is a separate pool of credit that adheres to the following rules:

- Credit is deducted from the available funds in the order configured by the administrator.
- If the designated account does not have enough credit, the next account in sequence will be used until all of the credit is used.
- If a print job costs more than the total credit in all accounts, the job is disallowed.

From the perspective of the end-user little changes when multiple accounts are enabled:

- The total balance of all accounts is displayed in the user client, release station, and end-user web interface.
- Printing, quotas, PrintCards and all other Print-Limit features work the same with multiple accounts as they do with a single account.
- The fact that there are multiple balances can optionally be effectively hidden from the user.

Important

Although the concept of multiple personal accounts is quite simple, the management may be complex depending on implementation. Readers are advised to read this chapter in full and conduction some planning before full deployment. Good print management in large organizations is hard enough, and multiple accounts if not implemented right could make it just that little bit harder!

26.1. Why use multiple personal accounts?

There are a number of reasons why a site might choose to enable multiple personal accounts, but the most common is the need to separate "free" print quotas from cash payments. Common reasons for considering multiple accounts are:

26.1.1. Separating Quota and Cash

Many sites such as colleges, schools and universities allow users to pay for printing via PrintCards or via credit card using a payment gateway like PayPal or Authorize.Net. When cash payments and "free" quota are combined into a single account balance it is not possible to give cash refunds without potentially refunding quota amounts.

Using multiple accounts to separate "quotas" and "cash" has a number of benefits:

1. Simplified auditing and tracking of cash payments and refunds.
2. Allows for refunding of unused cash payments at the end of year or enrollment.
3. Making cash payments does not interfere with "not to exceed" quota thresholds.

This configuration is discussed detail in Section 26.3.1, “Example 1: Separate Cash/Quota Accounts”.

26.1.2. Independently Managed Work Areas

In some more large and complex environments each department or faculty independently manage and control their own printer fleet. In these situations the departments may want to assign a "free" quota to their members/students that should only be used on their own printers. Any "free" quotas allocated from other departments must not be used on this department's printers. If the user adds cash to their account this may be used in any department.

In most environments this configuration is not required because the print policy is managed centrally. This is most useful when implementing a centralised Print-Limit installation in an environment where the departments historically had independent control of print policy. Using this configuration can be the first phase in a transition to a fully centralised system.

This is an advanced configuration and is discussed in details in Section 26.3.2, “Example 2: Department/Faculty Quotas (Advanced)”.

26.2. Configuration

Enabling and configuring multiple personal accounts is quite simple. However before enabling this feature it is recommended that you read this section and understand the concepts involved.

26.2.1. Enabling Multiple Personal Accounts

To enable multiple personal accounts:

1. Navigate to **Options** → **Advanced** → **Go to multiple personal account setup**.
2. Enable the **Enable multiple personal accounts option**.
3. The built-in default account is where initial credit is assigned and quota allocated.

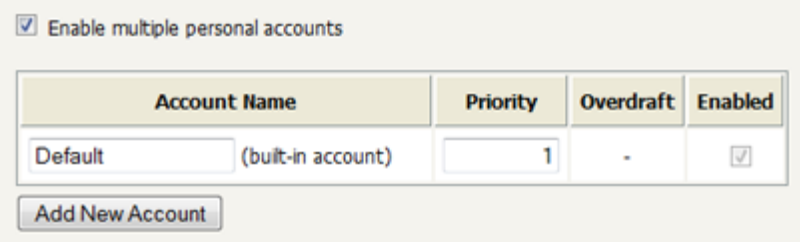


Figure 26.1. Enabling Multiple Personal Accounts for the first time

4. Press the **Add Account** button to add a new account. This will add a new account to the list with a blank description, and default options for priority and overdraft.
5. Enter a descriptive name for the account. This can be changed at any time.
6. Edit the account priority to change the order in which the account balances are used. Accounts at the top of the list (i.e. the lowest priority number) will be used first. The priority can be changed at any time. For more information on priorities see Section 26.2.2, “How Account Priorities Work”.
7. (Optional) Edit the overdraft value. This allows this account to go into negative. e.g. If the overdraft is set to $5.00, then the account will be allowed to go to $5.00 into negative.
8. Repeat these steps adding accounts as necessary. Take care to add only the accounts you require (See Section 26.2.4, “Why can't I delete accounts?”).
9. When the accounts are configured as required, press the **Set Up Accounts** button. This will start the process of creating the new accounts for all of your users.

26.2.2. How Account Priorities Work

When a user has multiple accounts it's important to have a well-defined order for how the balances are used. If one account is used for cash and the other for quotas, the quota credit should be used first before cash. The account priority defines this order. This is best explained with some examples.

The account priorities are configured with the "Default" account first and the "Cash" account second (as shown in the screenshot below).

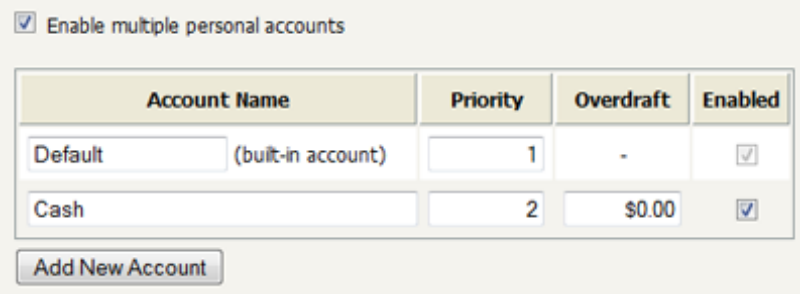


Figure 26.2. Multiple Account Priorities

Example 1: If a user has $1.00 in each of the "Default" and "Cash" accounts, and a $0.25 job is printed the cost of the job is deducted from the "Default" account, leaving a balance of $0.75.

Example 2: If a user has $1.00 in each of the "Default" and "Cash" accounts, and a $1.30 job is printed the cost of the job split between both accounts. First, the $1.00 available in the "Default" account is used, then the remaining $0.30 is deducted from the "Cash" account. The user is then left with $0.00 in the "Default" account and $0.70 in the "Cash" account.

Whenever a print job is refunded, the credit is refunded to the accounts in the reverse order.

26.2.3. Configuring the Cash/Payment Account

When a user has multiple personal accounts, one of these accounts must be nominated as the account where user payments will be credited. This account will be credited when the user adds credit to their account using PrintCards or through payment gateways (like PayPal or Authorize.Net).

To configure the "Cash/Payment" account:

1. Navigate to **Options** → **Advanced** → **Go to multiple personal account setup**.
2. Towards the bottom of the screen, select the account you'd like to use for cash/payments with the **User payments are added to** option.
3. Press the **Apply** button.

26.2.4. Why can't I delete accounts?

Once an account has been configured and created it cannot be deleted. Once an account is created it may be used immediately by users for their printing activity. If the account could be subsequently deleted, any transaction associated with that account would also need to be deleted, resulting in a confusing transaction history for the user.

Although accounts cannot be deleted, they can be disabled. Disabling the account means that it is no longer available to the user, nor displayed in their account details. From the perspective of the user the account no longer exists, and any associated balance is also no longer available. If the account is later re-enabled any previous balances will be made available to the user again.

Caution

Because accounts can't be deleted it's prudent to carefully plan accounts and their use before deployment.

26.2.5. Other Options

By default the end-user web interface displays just the total of all of the user accounts. To display an itemized list of each of the account balances enable the option on **Options** → **User Features** → **Itemize multiple personal accounts**, then press **Apply**.

If there is a need to change the available personal accounts or the order that they are used, the Advanced Printer Scripting feature can be used. This is described in Section 26.3.2, “Example 2: Department/Faculty Quotas (Advanced)”.

26.3. Configuration Examples

This section describes in detail how to set up Print-Limit for the most common uses for multiple personal accounts.

26.3.1. Example 1: Separate Cash/Quota Accounts

In environments where users have both freely allocated quotas and the option for users to pay for printing it's useful to separate quotas from cash. For a description of this scenario see Section 26.1.1, “Separating Quota and Cash”.

To configure multiple accounts for this situation:

1. Navigate to **Options** → **Advanced** → **Go to multiple personal account setup**.
2. Enable the **Enable multiple personal accounts option**.
3. The "Default" (built-in) account is used for quotas. Rename it to something appropriates (e.g. "Quotas").
4. Press the **Add Account** button to add a new account. This account will be used for user payments. Name it appropriately, and set the priority to a value higher than the default/built-in account. i.e. like the screenshot below.

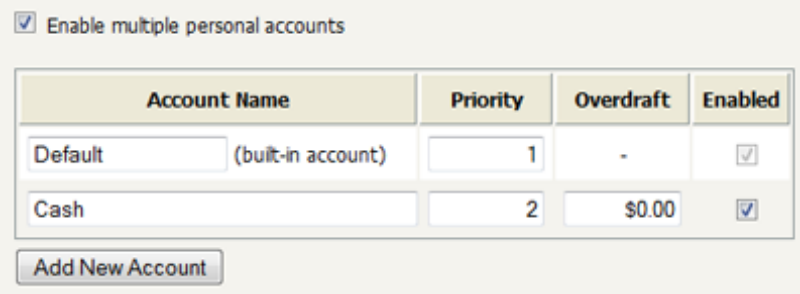


Figure 26.3. Separate Cash and Quota accounts

It is important that the accounts are given this priority order. This way any freely allocated quotas will be used before using the cash payments. This allows a user to add credit to their account and know that it will only be used when they run out of allocated quota.

5. Press the **Set Up Accounts** button to start applying the change.
6. When the account setup is complete, select the "Cash" account as the account for user payments. To do this select this account from the **User payments are added to** option.
7. Press the **Apply** button.

At this point the system is ready to use. Any cash payments from PrintCards or Payment Gateways are added to the selected cash account. The quotas will be added to the default/built-in account. (*Note:* Site running a Payment Gateway module released prior to version 10.5 may need to upgrade the gateway to leverage this setting.)

26.3.2. Example 2: Department/Faculty Quotas (Advanced)

A much more advanced configuration is required when different departments/faculties/areas want to each have their own quotas that are only available for use by their users on their printers. Department quotas are also often combined with user cash payments which can be used anywhere on site. For a description of this scenario see

Section 26.1.2, “Independently Managed Work Areas”.

This configuration requires the use of many advanced Print-Limit features. This section gives a brief outline of how this is configured.

- Enable multiple personal accounts and create the accounts for each of the work-areas or departments required. If users can also pay for printing also create a cash account. The priority/order of the quota accounts is not important, as long as the "Cash" account appears last. The screenshot below shows a possible configuration.

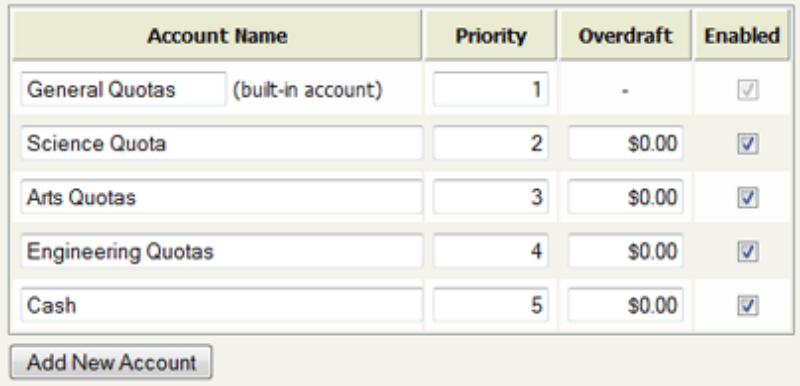


Figure 26.4. Example of an advanced account setup

Press the **Set Up Accounts** button to start applying the change.

- When the account setup is complete, select the "Cash" account as account for user payments. To do this select this account from the **User payments are added to** option. Then press the **Apply** button.
- At this point all the accounts are enabled and can be used on any printers. To restrict the accounts that can be used on different printers, the Advanced Printer Scripting feature can be used (see Chapter 16, *Advanced Scripting (Print Scripting)*). The advanced scripting provides a method (`actions.job.changePersonalAccountChargePriority`) that allows for changing both the accounts available and their order/priority. The method is documented in detail in Section 16.2.3, “Script Actions”.

  For example, the following script snippet, shows how to limit the available accounts to only "Science Quotas" and "Cash" (in that order).

```
actions.job.changePersonalAccountChargePriority(["Science Quotas", "Cash"]);
```

- Departments can allocate initial quotas at enrollment or periodically throughout the year using the web-service APIs or `server-command` to adjust user balances. All the balances affecting APIs/commands have a parameter to specify which of the accounts to adjust/set. For example, to use `server-command` to set the balance of the "Science Quotas" account to $10.00 for all members of the "Science Students" group:

```
server-command set-user-account-balance-by-group "Science Students" 10.0 \
       "Enrollment quota" "Science Quotas"
```

  This technique can be integrated with existing student management systems to automate the allocation of free print quota at the time of enrollment.

  For more information on web-service APIs or `server-command` see Section A.3, “The XML Web Services API” and Section A.1, “Server Commands (server-command)”.

With the power of Advanced Print Scripting and Multiple Personal Accounts much can be achieved. Large universities and colleges needing this level of flexibility also tend to have very competent IT staff. Take some time to bounce around some ideas. Here are a few:

- Use advanced print scripting to tune on/off access to accounts based on conditions such as group membership, time of day, device, etc.
- Automate account management tasks such as free quota assignment on course enrollment using scripts.
- Complex rules on which accounts are used and under which consider need to be clearly explained to users. Take some time to document this and communicate policy with staff/students/members.

Appendix A. Tools - database, server-command scripting, and APIs (Advanced)

This appendix outlines the command line tools and advanced programming tools that come with Print-Limit Pro. Using these tools has been discussed throughout this manual, however this provides a reference guide to these tools and their use.

Caution

The advanced tools provided with Print-Limit Pro are very powerful and offer opportunities for all manner of customizations and enhancements. However, if used incorrectly, these tools could lead to unexpected results. Many of the advanced tools are written for software and script developers. It is expected that readers intending to use advanced tools are comfortable with using the command-prompt, and developing system management and server monitoring programs.

A.1. Server Commands (server-command)

The `server-command` tool provides access to dozens of server operations ranging from user management, system maintenance, account manipulation and printer control. The `server-command` tool is ideal for controlling the Print-Limit Pro *Application Server* via the command-line or automating via scripts.

Some examples of how an Administrator may choose to use the `server-command` tool:

- Scheduling of online backups and data snapshots.
- Scheduling user and/or group synchronization tasks.
- Automating the addition of new users after the accounts are added to the network.
- Performing account transactions such as adding funds/quota to user accounts.
- Automating user account creation using custom scripts.
- Disabling/Enabling printers.
- Disabling/Enabling printing for users.
- Controlling user restriction levels.
- Managing shared accounts.

The `server-command` program is a command-line tool. It accepts the commands as arguments and outputs the results of the command on the console (standard-out). For security reasons only users with read access to the `server.properties` (normally only the `Administrators` group) have rights to execute the commands.

Typical use on a Windows system:

```
Add $10.00 to a user named 'testuser':

    C:\> cd [app-path]\server\bin\win
    C:\> server-command adjust-user-account-balance "testuser" 10.00 \
        "Added $10.00 to your account"
```

Note: backslash indicates text should be on the same line.

A.1.1. Accessing Server Commands remotely

Server commands can also be called remotely using standard remote command tools.

A.1.1.1. On Windows

Use PsExec [http://technet.microsoft.com/en-us/sysinternals/bb897553.aspx] - a remote command program provided by the Sysinternals team at Microsoft. For example (all on one line):

```
psexec.exe \\remoteserver \
  "C:\Program Files\Print-Limit Pro\server\bin\win\server-command.exe" \
   disable-printer printsrv1 labprinter -1
```

A.1.1.2. On Linux/Novell/Mac

Use SSH [http://en.wikipedia.org/wiki/Secure_Shell] - a secure remote command/shell program. SSH can be run non-interactively in scripts with the use of an authorized public key added under the printlimit account's ~/.ssh/authorized_keys list. For example (all on one line):

```
ssh printlimit@remoteserver \
  "/home/printlimit/server/bin/linux-[x64|i686]/server-command \
  disable-printer printsrv1 labprinter -1"
```

A.1.2. Available Commands

A full list of commands is available via `server-command --help`.

```
Usage: server-command COMMAND [ARGS...]

   COMMAND  : The server command name.
   ARGS     : A list of arguments to supply to the command.

COMMANDS:
    user-exists <username>
        Test to see if a user exists.
        <username> - the username to test.

    get-user-account-balance <username> [<account>]
        Get a user's current account balance.
        <username> - the user's username.
        [<account>] - Optional personal account name. Only used when multiple
            personal accounts are enabled. Leave blank to get total balance.

    get-user-property <username> <property>
        Gets a user property.
        <username> - the name of the user.
        <property> - the name of the property to get. Valid properties include:
            balance - the user's current account balance
            card-number - the user's card number
            card-pin - the user's card pin number
            default-shared-account - the user's default shared account name
            department - the user's department
            disabled-net - whether or not the user's internet access is
                           currently disabled
            disabled-print - whether or not the user's printing is currently
                             disabled
            email - the user's email
            full-name - the user's full name
            notes - notes for the user
            office - the user's office
            print-stats.job-count - the total print job count for the user
            print-stats.page-count - the total printed page count for the user
            net-stats.data-mb - the internet data used by the user (in MB)
```

```
        net-stats.time-hours - the internet time used by the user (in hours)
        restricted - whether or not the user is currently restricted

set-user-property <username> <property> <value>
    Sets a user property.
    <username> - the name of the user.
    <property> - the name of the property to set. Valid properties and
                 values include:
        balance - the user's current account balance (a decimal number)
        card-number - the user's card number (any text)
        card-pin - the user's card pin number (any text)
        department - the user's department (any text)
        disabled-net - whether or not the user's internet access is
                       currently disabled (TRUE or FALSE)
        disabled-print - whether or not the user's printing is currently
                         disabled (TRUE or FALSE)
        email - the user's email (an email address, or any text)
        full-name - the user's full name (any text)
        notes - notes for the user (any text)
        office - the user's office (any text)
        password - the user's password (for internal users only) (any text)
        restricted - whether or not the user is currently restricted
                     (TRUE or FALSE)
    <value> - the value to set (see <property> for valid values).

adjust-user-account-balance <username> <adjustment> <comment> [<account>]
    Adjust a user's account balance.
    <username> - the user's username.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when multiple
        personal accounts are enabled.

adjust-user-account-balance-if-available \
                  <username> <adjustment> <comment> [<account>]
    Adjust a user's account balance if there is enough credit available.
    <username> - the user's username.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when multiple
        personal accounts are enabled.

adjust-user-account-balance-if-available-leave-remaining <username> \
                  <adjustment> <leave-remaining> <comment> [<account>]
    Adjust a user's account balance if there is enough credit available
    to leave the given amount available in the account.
    <username> - the user's username.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <leave-remaining> - the amount to leave in the account.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when multiple
        personal accounts are enabled.

adjust-user-account-balance-by-group <group> <adjustment> \
                  <group> <adjustment> <comment> [<account>]
    Adjust the account balance for all users in a group.  This process
    happens in the background.
    <group> - the group for which all users' accounts are to be adjusted.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <comment> - a comment to be associated with the transaction.
    [<account>] - Optional personal account name. Only used when multiple
        personal accounts are enabled.

adjust-user-account-balance-by-group-up-to <group> <adjustment> <limit>
                                           <comment> [<account>]
    Adjust the account balance for all users in a group, but don't increase
    user balance beyond the given limit.  This process happens in the
    background.
    <group> - the group for which all users' accounts are to be adjusted.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
```

```
        <limit> - don't increase user balance beyond this limit.
        <comment> - a comment to be associated with the transaction.
        [<account>] - Optional personal account name. Only used when multiple
            personal accounts are enabled.

    set-user-account-balance <username> <balance> <comment> [<account>]
        Set a user's account balance to a set value.
        <username> - the user's username.
        <balance> - set the account to this value. +ve or -ve.
        <comment> - a comment to be associated with the transaction.
        [<account>] - Optional personal account name. Only used when multiple
            personal accounts are enabled.

    set-user-account-balance-by-group <group> <balance> <comment> [<account>]
        Set the balance for each member of a group to the given value.  This
        process happens in the background.
        <group> - the group for which all users' balance is to be set.
        <balance> - the value to set all users' balance to. +ve or -ve.
        <comment> - a comment to be associated with the transaction.
        [<account>] - Optional personal account name. Only used when multiple
            personal accounts are enabled.

    reset-user-counts <username> <reset_by>
        Reset the page and job counts associated with a user.
        <username> - the user's username.
        <reset_by> - name of the user/script/process resetting the counts.

    re-apply-initial-user-settings <username>
        Re-applies initial settings on the user. Initial user settings are based
        on group membership.
        <username> - the user's username.

    disable-printing-for-user <username> <minutes_disabled>
        Disable printing for a user for a set period of time.
        <username> - the name of the user to disable printing for.
        <minutes_disabled> - the time in minutes to disable. -1 indicates
        forever.

    add-new-user <username>
        Trigger the process of adding a new user account. Assuming the user
        exists in the OS/Network/Domain user directory, the account will be
        created with the correct initial settings as defined by the rules
        set up in the admin interface under the Groups section.
        <username> - the user's system username.

    rename-user <current_username> <new_username>
        Rename the given existing user. Use this method with care. Renaming a
        user should be performed in conjunction with renaming the user in the
        OS/Network/Domain.
        <current_username> - the name of the user to rename.
        <new_username> - the user's new name.

    delete-existing-user <username>
        Delete a user account from the system.  Use this method with care.
        Calling this will perminantly delete the user account from the user
        list (print history records remain).
        <username> - the user's system username.

        add-new-internal-user <username> <password> <full_name> <email>
                              <identity_number> <pin>
                Add a new internal user. It can also set user's properties such as their
        password, full name, email address, card/identity number and card pin.
    <username> - the username of the new internal user.
    <password> - the password of the user. It cannot be left blank. (any text)
    <full_name> - the full name of the user. (any text)
    <email> - the email of the user. (any text)
    <identity_number> - the user's card/identity number. (any text)
    <pin> - the user's card pin number. (any text)

    look-up-user-name-by-id-no <id-no>
```

```
    Looks up the user with the given user id number and prints out their
    user name.  If no match was found an empty line is printed out.
    <id-no> - The user id number to look up.

look-up-user-name-by-card-no <card-no>
    Looks up the user with the given user card number and prints out their
    user name.  If no match was found an empty line is printed out.
    <card-no> - The user card number to look up.

add-user-to-group <username> <group>
      Add a user to the specified group. It changes the group
      membership within the application not in the OS/Network/Domain user
      directory.
    <username> - the name of the user.
    <group> - the name of the group to which the user needs to be added.

remove-user-from-group <username> <group>
      Remove a user from the specified group. It changes the group
      membership within the application not in the OS/Network/Domain user
      directory.
    <username> - the name of the user.
    <group> - the name of the group from which the user needs to be removed.

add-admin-access-user <username>
    Add a user as an admin with default admin rights.
    <username> - the name of the user.

remove-admin-access-user <username>
    Remove an admin user from the list of admins.
    <username> - the name of the user.

add-admin-access-group <groupname>
    Add a group as an admin group with default admin rights.
    <groupname> - the name of the group.

remove-admin-access-group <groupname>
    Remove a group from the list of admin groups.
    <groupname> - the name of the group.

set-user-account-selection-auto-select-shared-account <username>
                                                      <account_name>
                                                      <charge_personal>
    Sets a user's account selection to charge to a single shared account.
    <username> - the name of the user.
    <account_name> - Full name of the shared account to charge to.
    <charge_personal> - whether or not personal account should be charged.
                        (TRUE or FALSE)
set-user-account-selection-auto-charge-personal <username>
    Sets a user's account selection to automatically charge to personal.
    account.
    <username> - the name of the user.
set-user-account-selection-standard-popup <username> <allow_personal>
                                          <allow_list_selection>
                                          <allow_pin_code>
                                          <allow_printing_as_another_user>
                                          <charge_to_personal>
    Sets a user's account selection to standard account selection popup.
    <username> - the name of the user.
    <allow_personal> - allow user to charge to personal account.
    <allow_list_selection> - allow user to select a shared account from
                             list. (TRUE  or FALSE)
    <allow_pin_code> - allow user to select a shared account using pin.
    <allow_printing_as_another_user> - allow user to print as another user.
    <charge_to_personal> - when shared account is selected charge to
                           personal account. (TRUE or FALSE)
list-user-accounts
    List the names of all the user accounts in the system, sorted by
    username, one per line.

list-shared-accounts
```

```
    List the names of all the shared accounts in the system, sorted by
    shared account name, one per line.

list-user-shared-accounts <username>
    List the names of all the shared accounts accessible by the given user
    sorted by account name, one per line.

shared-account-exists <account_name>
    Test to see if a shared account exists.
    <account_name> - the shared account name to test.

get-shared-account-account-balance <account_name>
    Get shared account's current account balance.
    <account_name> - the shared account's full name.

get-shared-account-property <account_name> <property>
    Gets a shared account property.
    <account_name> - the name of the user.
    <property> - the name of the property to get. Valid properties include:
        access-groups - the shared account's access groups
                        (a comma separated list)
                        Use blank to clear all groups
        access-users - the shared account's access users
                       (a comma separated list)
                        Use blank to clear all users
        balance - the shared account's current balance
        comment-option - the shared account's commenting option
        disabled - whether or not the shared account is currently disabled
        invoice-option - the shared account's invoicing option
        notes - notes for the shared account
        pin - the shared account's PIN
        restricted - whether or not the shared account is currently
                     restricted

set-shared-account-property <account_name> <property> <value>
    Sets a shared account property.
    <account_name> - the name of the shared account.
    <property> - the name of the property to set. Valid properties and
                 values include:
        access-groups - the shared account's access groups)
                        (a comma separated list)
        access-users - the shared account's access users
                       (a comma separated list)
        balance - the shared account's current balance (a decimal number)
        comment-option - the shared account's commenting option. One of:
            NO_COMMENT - no comment may be entered
            COMMENT_REQUIRED - a comment must be entered
            COMMENT_OPTIONAL - the user may enter a comment or not
        disabled - whether or not the shared account is currently disabled
                   (TRUE or FALSE)
        invoice-option - the shared account's invoicing option. One of:
            ALWAYS_INVOICE - print jobs will always be invoiced
            NEVER_INVOICE - print jobs will never be invoiced
            USER_CHOICE_ON - the user can choose (default on/yes)
            USER_CHOICE_OFF - the user can choose (default off/no)
        notes - notes for the shared account (any text)
        pin - the shared account's PIN (any text, must be unique)
        restricted - whether or not the shared account is currently
                     restricted (TRUE or FALSE)
    <value> - the value to set (see <property> for valid values).

adjust-shared-account-account-balance <account_name> <adjustment> <comment>
    Adjust a shared account's account balance.
    <account_name> - the shared account's full name.
    <adjustment> - the adjustment amount as a number. +ve or -ve.
    <comment> - a comment to be associated with the transaction.

set-shared-account-account-balance <account_name> <balance> <comment>
    Set a shared account's balance to a set value.
    <account_name> - the shared account's full name.
```

```
    <balance> - set the account to this value. +ve or -ve.
    <comment> - a comment to be associated with the transaction.

add-new-shared-account <shared_account_name>
    Add a new shared account.
    <shared_account_name> - the name of the shared account.

rename-shared-account <curr_shared_account_name> <new_shared_account_name>
    Rename an existing shared account.
    <curr_shared_account_name> - Current shared account name. Use a '\' to
                                 denote a subaccount e.g.: 'parent\sub'
    <new_shared_account_name> - New shared account name.

delete-existing-shared-account <shared_account_name>
    Delete a shared account from the system.  Use this method with care.
    Calling this will permanently delete it from the shared account list
    (print history records will remain).
    <shared_account_name> - the name of the shared account to delete.

add-shared-account-access-user <shared_account_name> <username>
    Allow the given user access to the given shared account without using
    a pin.
    <shared_account_name> - the name of the shared account to allow access
                            to.
    <username> - the name of the user to give access to.

add-shared-account-access-group <shared_account_name> <group_name>
    Allow the given group access to the given shared account without using
    a pin.
    <shared_account_name> - the name of the shared account to allow access
                            to.
    <group_name> - the name of the group to give access to.

remove-shared-account-access-user <shared_account_name> <username>
    Revoke the given user'- access to the given shared account.
    <shared_account_name> - the name of the shared account to revoke access
                            to.
    <username> - the name of the user to revoke access for.

remove-shared-account-access-group <shared_account_name> <group_name>
    Revoke the given group's access to the given shared account.
    <shared_account_name> - the name of the shared account to revoke access
                            to.
    <group_name> - the name of the group to revoke access for.


get-printer-property <server_name> <printer_name> <property>
    Gets a printer property.
    <server_name> - the name of the server the printer is hosted on.
    <printer_name> - the name of the printer.
    <property> - the name of the property to get. Valid properties include:
        disabled - whether or not the printer is currently disabled
        print-stats.job-count - the total print job count for this printer
        print-stats.page-count - the total printed page count for this
                                 printer
        cost-model - the cost model used by the printer (e.g. SIMPLE)
        custom-field-1 - the value for custom field 1 if set.
        custom-field-2 - the value for custom field 2 if set.
        custom-field-3 - the value for custom field 3 if set.
        custom-field-4 - the value for custom field 4 if set.
        custom-field-5 - the value for custom field 5 if set.
        custom-field-6 - the value for custom field 6 if set.

set-printer-property <server_name> <printer_name> <property> <value>
    Sets a printer property.
    <server_name> - the name of the server the printer is hosted on.
    <printer_name> - the name of the printer.
    <property> - the name of the property to set. Valid properties and
                 values include:
        disabled - whether or not the printer is currently disabled
```

```
                    (TRUE or FALSE)
          custom-field-1 - the value for custom field 1
          custom-field-2 - the value for custom field 2
          custom-field-3 - the value for custom field 3
          custom-field-4 - the value for custom field 4
          custom-field-5 - the value for custom field 5
          custom-field-6 - the value for custom field 6
          override-user-level-settings - whether or not printer should
                                         override user level settings.
                                         (TRUE or FALSE)
          override-user-level-settings-charge-to - the name of the shared
                                  account. Use "[personal]" for personal
                                  account. Use blank to disable charge to
                                  settings.
      <value> - the value to set (see <property> for valid values).

  list-printers
      List the names of all the printers in the system, sorted by
      printer name, one per line.

  set-printer-cost-simple <server_name> <printer_name> <cost_per_page>
      Sets the printer's page cost (using SIMPLE charging model).
      <server_name> - the name of the server the printer is hosted on.
      <printer_name> - the name of the printer.
      <cost_per_page> - the cost per page (simple charging model)

  get-printer-cost-simple <server_name> <printer_name>
      Get the printer's page cost (using SIMPLE charging model).
      <server_name> - the name of the server the printer is hosted on.
      <printer_name> - the name of the printer.

  reset-printer-counts <server_name> <printer_name> <reset_by>
      Reset the page and job counts associated with a printer.
      <server_name> - the name of the server hosting the printer.
      <printer_name> - the printer's name.
      <reset_by> - name of the user/script/process resetting the counts.

  add-printer-group <server_name> <printer_name> <printer_group_name>
      Add a printer to a single printer group in addition to existing printer
      group membership.
      <server_name> - the name of the server hosting the printer.
      <printer_name> - the printer's name.
      <printer_group_name> -  name of a printer group.

  set-printer-groups <server_name> <printer_name> <printer_group_names>
      Set the printer groups a printer belongs to, overwriting any existing
      group membership.
      <server_name> - the name of the server hosting the printer.
      <printer_name> - the printer's name.
      <printer_group_names> - a comma separated list of printer group names.
                              To clear all group association set to "".

  enable-printer <server_name> <printer_name>
      Enable a printer.
      <server_name> - the name of the server hosting the printer.
      <printer_name> - the printer's name.

  disable-printer <server_name> <printer_name> <minutes_disabled>
      Disable a printer for a set period of time.
      <server_name> - the name of the server hosting the printer.
      <printer_name> - the printer's name.
      <minutes_disabled> - the time in minutes to disable. -1 indicates
      forever.

  delete-printer <server_name> <printer_name>
      Delete a printer.
      <server_name> - the name of the server hosting the printer.
      <printer_name> - the printer's name. Use "[All Printers]" to delete
                       all printers on the specified server.
```

```
rename-printer <server_name> <printer_name> <new_server_name>
               <new_printer_name>
    Rename a printer. This can be useful after migrating a print queue or
    print server (i.e. the printer retains its history and settings under
    the new name). Note that in some cases case sensitivity is important, so
    care should be taken to enter the name exactly as it appears in the OS.
    <server_name> - the existing printer's server name
    <printer_name> - the existing printer's queue name
    <new_server_name> - the new printer's server name
    <new_printer_name> - the new printer's queue name

add-printer-access-group <server_name> <printer_name> <group_name>
    Adds the user group to the printer's access group list.
    <server_name> - the printer's server name
    <printer_name> - the printer's queue name
    <group_name> - the name of the user group that needs to be added.

remove-printer-access-group <server_name> <printer_name> <group_name>
    Removes the user group from the printer's access group list.
    <server_name> - the printer's server name
    <printer_name> - the printer's queue name
    <group_name> - the name of the user group that needs to be removed.

add-new-group <group_name>
    Add a new group to the system's group list. The group should already
    exist in network directory.
    <group_name> - The name of the group to add.

remove-group <group_name>
    Removes the group.
    <group_name> - The name of the group to remove.

list-user-groups
    List the names of all the user groups in the system, sorted by
    groupname, one per line.

group-exists <group_name>
    Test to see if a group exists.
    <group_name> - the group name to test.

set-group-quota <group_name> <quota_amount> <period> <quota_max_accum>
    <group_name> - the name of the group to set.
    <quota_amount> - the quota amount.
    <period> - the schedule period (i.e. DAILY, WEEKLY, MONTHLY).
    <quota_max_accum> - the quota maximum accumulation amount. Set to
                        0.0 to have no limit.

use-card <user_name> <card_number>
    Redeem a card and place the credit on the user's account.
    <user_name> - the name of the user with the account to credit.
    <card_number> - the number of the card to use.

perform-online-backup
    Start an online backup.  The back file is written to
    ~/server/data/backups. as a dated, zipped XML file. This process
    happens in the background.

perform-group-sync
    Start the process of synchronizing the system's group membership with
    the OS/Network/Domain's group membership. A call to this method will
    commence the sync process and the operation will complete in the
    background.

perform-user-and-group-sync
    Start a full user and group synchronization. This is equivalent to
    pressing the "Synchronize Now" button in the admin interface. No
    existing users will be removed. Whether or not full details for existing
    users will be updated depends on the current user/group sync settings as
    defined in the admin interface. A call to this method will commence the
    sync process and the operation will complete in the background.
```

```
perform-user-and-group-sync-advanced <delete_old_users> <update_details>
    An advanced version of the user and group synchronization process
    providing control over the sync settings. A call to this method will
    commence the sync process and the operation will complete in the
    background.
    <delete_old_users> - set to TRUE remove old users, else FALSE.
    <update_details> - set to TRUE if existing users details (e.g. email,
                       full-name, etc. ) are to be updated.

add-new-users
    Calling this method will start a specialized user and group
    synchronization process optimized for tracking down adding any new
    users that exist in the OS/Network/Domain user directory and not in
    the system. Any existing user accounts will not be modified. A group
    synchronization will only be performed if new users are actually added
    to the system.

is-task-complete
    Returns TRUE if a long running task such as perform-group-sync,
    perform-user-and-group-sync, or add-new-users has completed.

get-task-status
    Returns status information such as progress, completion status and,
    error messages, on the current or last run long running task such as
    perform-group-sync, perform-user-and-group-sync, or add-new-users.

batch-import-shared-accounts <import_file> <test>
                             <delete_non_existent_accounts>
    Import the shared accounts contained in the given tab-delimited import
    file.
    <import_file> - the import file location.
    <test> - (TRUE or FALSE) If TRUE, perform a test only. The printed
             statistics will show what would have occurred if testing
             wasn't enabled. No accounts will be modified.
    <delete_non_existent_accounts> - (TRUE or FALSE) If TRUE, accounts that
                         do not exist in the import file but exist in the
                         system will be deleted.  If FALSE, they will be
                         ignored.

batch-import-users <import_file> <create_new_users>
    Import the users contained in the given tab-delimited import
    file.  See the user manual chapter 'Batch User Data Import and Update'
    for a description of the file format.
    <import_file> - the import file location.
    <create_new_users>
          If TRUE, users only existing in the import file will be newly
          created, otherwise ignored.

batch-import-internal-users <import_file> <overwrite_existing_passwords>
                            <overwrite_existing_pins>
    Import the internal users contained in the given tab-delimited import
    file.  See the user manual chapter 'Managing Guests and Internal Users'
    for a description of the file format.
    <import_file> - the import file location.
    <overwrite_existing_passwords> (optional, default TRUE) - (TRUE or
          FALSE) If TRUE, passwords from the import file will overwrite
          existing passwords where a user already has a has a password set.
          If FALSE, existing passwords will not be changed.
    <overwrite_existing_pins> (optional, default TRUE) - (TRUE or FALSE) If
          TRUE, PINs from the import file will overwrite existing PINs where
          a user already has a has a PIN set.  If FALSE, existing PINs will
          not be changed.

batch-import-user-card-id-numbers <import_file> <overwrite_existing_pins>
    Import the user card/ID numbers and PINs contained in the given
    tab-delimited import file.  See the user manual chapter 'Advanced User
    Management' for a description of the file format).
    <import_file> - the import file location.
    <overwrite_existing_pins> (optional, default TRUE) - (TRUE or FALSE) If
```

```
            TRUE, PINs from the import file will overwrite existing PINs where
            a user already has a has a PIN set.  If FALSE, existing PINs will
            not be changed.

    create-user-client-accounts-file
        Saves a file containing shared accounts data for the user client.
        See the manual for more information on how this feature can be used.
        The file will be saved on the server to the location:
            [app-path]\server\data\client\client-accounts.dat

        If this file already exists it will be over-written.

    get-config <config-name>
        Gets the value of the given config value printing the result.
        If the config value does not exist, a blank string is displayed.
        <config-name> - the name of the config value to get.

    set-config <config-name> <config-value>
        Sets the value of the give config item.
        NOTE: Take care updating config values. You may cause serious
              problems which can only be fixed by reinstallation of
              the application. Use the set-config command at your own risk.
        <config-name> - the name of the config value to set.
        <config-value> - the value to set.

    process-job <job-details>
        Takes the details of a job and logs and charges as if it were a "real"
        job.  Jobs processed via this method are not susceptible to filters,
        pop-ups, hold/release queues etc., they are simply logged.  See the user
        manual section "Importing Job Details" for more information and the
        format of <job-details>.
        <job-details> - the details of the job to log.

    run-command command-name [command args]
        Runs a custom command on the server. By default the server does not
        include any custom commands.  The command arguments depend on the custom
        command being run.
```

Tip

`server-command` is ideal for scripting via batch files or shell scripts. Some example scripts can be found at `[app-path]/server/examples/scripting/`.

Administrators wishing to control Print-Limit Pro using a programming language such as C#, Java, Visual Basic, Perl, Ruby or Python should consider the XML Web Services APIs. All commands available via the `server-command` tool are also accessible via calls to the Web Services layer.

More information on the XML Web Services API is available in Section A.3, “The XML Web Services API”.

A.2. Database Tool (db-tools)

The `db-tools` command-line tool provides a variety of functionality manipulating the Print-Limit Pro database and data. The syntax of the command is:

```
db-tools command [options]
```

The valid commands are:

- `export-db` - export/backup the database data
- `import-db` - import/restore the database data
- `init-db` - create tables and initial data in a new database
- `delete-old-logs` - delete old log data (transaction, print, app log, etc)

`db-tools` is a command-line application accessed via the Command Prompt on Windows, or a Command Shell (e.g. bash or a terminal) on Linux and Mac. On Linux or Mac the command must be run as the `printlimit` user. Example use on the Apple Mac:

```
sudo su - printlimit
db-tools import-db -f /Users/bob/printlimit-backup.zip
```

`db-tools` needs exclusive access to the database. It is important that any Print-Limit Pro services and processes are stopped before executing any commands. Failure to do so will result in a "database in use" error message. The `db-tools` command is a powerful low-level utility and its use on a production system should be carefully considered. The available commands are discussed in detail below.

A.2.1. export-db Command

The export-db command exports the data from the database. The application server must be stopped before performing the export. The syntax and options for the `export-db` command are:

Tip

If you want to perform an online backup without stopping the application server you can use the inbuilt `perform-online-backup` server command.

More information on the server commands is available in Section A.1, “Server Commands (server-command)”.

```
usage: db-tools export-db [options]
 -d,--dir <dir>     Exports the database to the given directory.
 -f,--file <file>   Exports the database to the given file.
 -h,--help          Displays this help.
```

If no options are specified then the database export file is created in the `[app-path]\server\data\backups` directory and the file is named `export-[date-time].zip`.

The `--dir` option is used to override the default backup directory. The filename will still be named `export-[date-time].zip`.

The `--file` option is used to specify the full path and filename where the backup is saved.

Caution

If the directory or filename parameters contains space, then the argument needs to be quoted.

A.2.2. import-db Command

The `import-db` command imports the data (from a previous export) into the database. The application server must be stopped to perform the import. The syntax and options for the `import-db` command are:

```
usage: db-tools import-db [options] import-file
 -f,--force   Deletes any existing data before loading the data.
 -h,--help    Displays this help.
```

The `--force` option is required when the data is loaded into a database that already contains data. In this situation, the force option indicates that existing data will be deleted first.

Caution

If the import-file contains spaces this argument will need to be quoted.

A.2.3. init-db Command

The `init-db` command initializes a database, creating the required tables and initial data. The application server must be stopped before you initialize the database. The syntax and options for the `init-db` command are:

```
usage: db-tools init-db [options]
 -f,--force   Re-initializes the database even if it already exists.
 -h,--help    Displays this help.
```

The `--force` option is required to initialize a database that already contains the tables and data. In this case the force option will drop the existing tables before recreating the tables.

A.2.4. delete-old-logs Command

The `delete-old-logs` is used to delete old log data from the system. This command will permanently delete the following data.

- Printer usage logs - Record all print history and statistics
- Account transactions - Record all adjustments to user and shared accounts
- Application logs - Record application status and error messages

```
usage: db-tools delete-old-logs [options] delete-older-than-days
 -n,--non-interactive   Perform deletion without confirmation.
 -h,--help              Displays this help.
```

The `--non-interactive` option will perform the deletion without confirmation from the user. This can be useful when automating this deletion through a scheduled task or cron job.

The `delete-older-than-days` option determines what data will be deleted. If `delete-older-than-days` is 90, then all log data more than 90 days old will be deleted. A value of zero (0) will remove *all* historical log data from the system.

A.3. The XML Web Services API

Over the past few years, *Web Services* has been one of the IT industry's "buzz words" - and rightly so! Web Services provide a standardized way to transfer data and call functions across different operating system, programming languages, and networks. Web Services data is transmitted over standard HTTP and uses standardized XML mark-up.

There are two main Web Services implementations used for Remote Procedure Call (RPC):

- SOAP/WSDL
- XML-RPC

Print-Limit Pro uses XML-RPC. XML-RPC is a lightweight web services implementation and has good support for all major programming and scripting languages such as C#, Java, Visual Basic, Perl, Ruby and Python. The list of XML-RPC methods exposed by Print-Limit Pro at the URL `http://[server_name]:9191/rpc/api/xmlrpc` are summarized below:

Method	Description
`api.isUserExists`	Test to see if a user exists in the system/database.
`api.getUserAccountBalance`	Get the user's current account balance.
`api.getUserProperty`	Gets a user property. Properties include the user's full name, department, email, notes, office and restriction status among others.
`api.getUserProperties`	Get multiple user properties at once. Properties include the user's full name, department, email, notes, office and restriction status among others.
`api.setUserProperty`	Sets a user property. Properties include the user's full name, department, email, notes, office, password (for internal users) and restriction status among others.
`api.setUserProperties`	Set multiple user properties at once. Properties include the user's full name, department, email, notes, office, password (for internal users) and restriction status among others.
`api.adjustUserAccountBalance`	Adjust a user's account balance by an adjustment amount. An adjustment may be positive (add to the user's account) or negative (subtract from the account).
`api.adjustUserAccountBalanceIfAvailable`	Adjust a user's account balance if there is enough credit available.
`api.adjustUserAccountBalanceIfAvailableLeaveRemaining`	Adjust a user's account balance if there is enough credit available to leave the given amount available in the account.
`api.adjustUserAccountBalanceByGroup`	Adjust the account balance for all users in a group by an adjustment amount. An adjustment may be positive (add to the user's account) or negative (subtract from the account).
`api.adjustUserAccountBalanceByGroupUpTo`	Adjust the account balance for all users in a group by an adjustment amount, but not above the given limit. An adjustment may be positive (add to the user's account) or negative (subtract from the account).
`api.setUserAccountBalance`	Set the balance on a user's account to a set value. This is conducted as a transaction.
`api.setUserAccountBalanceByGroup`	Set the balance for each member of a group to the given value.
`api.resetUserCounts`	Reset the counts (pages and job counts) associated with a user account.
`api.reapplyInitialUserSettings`	Re-applies initial settings on the user. Initial user settings are based on group membership.
`api.disablePrintingForUser`	Disable printing for a user for selected period of time.
`api.addNewUser`	Triggers the process of adding a new user account defined by a given `username`. Assuming the user exists in the OS/Network/Domain user directory, the account will be created with the correct initial settings as defined by the rules set up in the admin interface under the Group's section. Calling this method is equivalent to triggering the "new user" event when a new user performs printing for the first time.
`api.renameUserAccount`	Rename a user account. Useful when the user has been renamed in the domain / directory, so that usage history can be maintained for the new username. This should be performed in conjunction with a rename of the user in the domain / user directory, as all future usage and authentication will need to use the new username.
`api.deleteExistingUser`	Delete/remove an existing user from the user list. Use this method with care. Calling this will perminently delete the user account from the user list (print and transaction history records remain).
`api.addNewInternalUser`	Add a new internal user. It can also set user's properties such as their

Method	Description
	password, full name, email address, card/identity number and card pin. Password of the user should not be left blank.
`api.lookUpUserNameByIDNo`	Looks up the user with the given user id number and returns their user name. If no match was found an empty string is returned.
`api.lookUpUserNameByCardNo`	Looks up the user with the given user card number and returns their user name. If no match was found an empty string is returned.
`api.addAdminAccessUser`	Add a user as an admin with default admin rights.
`api.removeAdminAccessUser`	Remove an admin user from the list of admins.
`api.addAdminAccessGroup`	Add a group as an admin group with default admin rights.
`api.removeAdminAccessGroup`	Remove a group from the list of admin groups.
`api.setUserAccountSelectionAutoSelectSharedAccount`	Sets a user's account selection to charge to a single shared account.
`api.setUserAccountSelectionAutoChargePersonal`	Sets a user's account selection to automatically charge to personal account
`api.setUserAccountSelectionStandardPopup`	Sets a user's account selection to standard account selection popup.

`api.listUserAccounts`	List all user accounts (sorted by username) starting at `offset` and ending at `limit`. This can be used to enumerate all user accounts in 'pages'. When retrieving a list of all user accounts, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing.
	
	E.g.:
	
	`listUserAccounts("authToken", 0, 1000) -`
	`returns users 0 through 999`
	`listUserAccounts("authToken", 1000, 1000) -`
	`returns users 1000 through 1999`
	`listUserAccounts("authToken", 2000, 1000) -`
	`returns users 2000 through 2999`

`api.listSharedAccounts`	List all shared accounts (sorted by account name) starting at `offset` and ending at `limit`. This can be used to enumerate all shared accounts in 'pages'. When retrieving a list of all accounts, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing.
	
	E.g.:
	
	`listSharedAccounts("authToken", 0, 1000) -`
	`returns shared accounts 0 through 999`
	`listSharedAccounts("authToken", 1000, 1000) -`
	`returns shared accounts 1000 through 1999`
	`listSharedAccounts("authToken", 2000, 1000) -`
	`returns shared accounts 2000 through 2999`

`api.listUserSharedAccounts`	List all shared accounts the user has access to (sorted by account name), starting at `offset` and ending at `limit`. This can be used to enumerate the accounts in 'pages'. When retrieving a list of all accounts, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing.
	
	E.g.:
	
	`listUserSharedAccounts("authToken", "username", 0, 1000) -`
	`returns users 0 through 999`
	`listUserSharedAccounts("authToken", "username", 1000, 1000) -`
	`returns users 1000 through 1999`
	`listUserSharedAccounts("authToken", "username", 2000, 1000) -`
	`returns users 2000 through 2999`

`api.isSharedAccountExists`	Test to see if a shared account exists in the system/database.
`api.setSharedAccountAccountBalance`	Sets a shared account's current account balance.
`api.getSharedAccountAccountBalance`	Gets a shared account's current account balance.

Method	Description
`api.setSharedAccountProperty`	Sets a shared account property. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
`api.setSharedAccountProperties`	Sets multiple shared account properties at once. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
`api.getSharedAccountProperty`	Gets a shared account property. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
`api.getSharedAccountProperties`	Gets multiple shared account properties at once. Properties include access groups, balance, comment options, disabled status, notes, pin and restriction status among others.
`api.adjustSharedAccountAccountBalance`	Adjust a shared account's account balance by an adjustment amount. An adjustment may be positive (add to the account) or negative (subtract from the account).
`api.setSharedAccountAccountBalance`	Set the balance on a shared account to a set value. This is conducted as a transaction.
`api.addNewSharedAccount`	Create a new shared account with the given name.
`api.deleteExistingSharedAccount`	Delete a shared account from the system. Use this method with care. Deleting a shared account will permanently delete it from the shared account list (print history records will remain).
`api.addSharedAccountAccessUser`	Allow the given user access to the given shared account without using a pin.
`api.renameSharedAccount`	Rename an existing shared account.
`api.deleteExistingSharedAccount`	Delete a shared account from the system. Use this method with care. Calling this will permanently delete it from the shared account list.
`api.addSharedAccountAccessGroup`	Allow the given group access to the given shared account without using a pin.
`api.removeSharedAccountAccessUser`	Revoke the given user's access to the given shared account.
`api.removeSharedAccountAccessGroup`	Revoke the given group's access to the given shared account.
`api.getPrinterProperty`	Gets a printer property. Available properties include: disabled, print-stats.job-count, print-stats.page-count.
`api.setPrinterProperty`	Sets a printer property.

`api.listPrinters`	List all printers (sorted by printer name), starting at `offset` and ending at `limit`. This can be used to enumerate the printers in 'pages'. When retrieving a list of all printers, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing.
	E.g.:
	`listPrinters("authToken", 0, 1000) - returns printers 0 through 999`
	`listPrinters("authToken", 1000, 1000) - returns printers 1000 through 1999`
	`listPrinters("authToken", 2000, 1000) - returns printers 2000 through 2999`

`api.setPrinterCostSimple`	Set a page cost using the Simple Charging Model.
`api.getPrinterCostSimple`	Get the page cost if, and only if, the printer is using the Simple Charging Model.
`api.resetPrinterCounts`	Reset the counts (pages and job counts) associated with a printer.
`api.addPrinterGroup`	Add a printer to a single printer group.
`api.setPrinterGroups`	Set the printer groups a printer belongs to, overwriting any existing group.
`api.enablePrinter`	Enables a printer.

Method	Description
api.disablePrinter	Disable a printer for select period of time.
api.deletePrinter	Delete a printer. Use the special text "[All Printers]" to delete all printers on the specified server.
api.renamePrinter	Rename a printer. This can be useful after migrating a print queue or print server (i.e. the printer retains its history and settings under the new name). Note that in some cases case sensitivity is important, so care should be taken to enter the name exactly as it appears in the OS.
api.addPrinterAccessGroup	Add a user group to the printer's access group list.
api.removePrinterAccessGroup	Remove a user group from the printer's access group list.
api.addNewGroup	Add a new group to system's group list.
api.RemoveGroup	Remove a group.

api.listUserGroups	List all groups (sorted by group name), starting at `offset` and ending at `limit`. This can be used to enumerate the groups in 'pages'. When retrieving a list of all groups, the recommended page size / limit is `1000`. Batching in groups of 1000 ensures efficient transfer and processing.
	E.g.:
	`listUserGroups("authToken", 0, 1000) -`
	`returns groups 0 through 999`
	`listUserGroups("authToken", 1000, 1000) -`
	`returns groups 1000 through 1999`
	`listUserGroups("authToken", 2000, 1000) -`
	`returns groups 2000 through 2999`

api.isGroupExists	Test to see if a group exists in the system.
api.setGroupQuota	Set the group quota allocation settings on a given group.
api.getGroupQuota	Get the group quota allocation settings on a given group.
api.useCard	Redeem a card and place the credit on the user's account.
api.performOnlineBackup	Instigate an online backup. This process is equivalent to pressing the manual backup button in the web based admin interface. The data is exported into the server/data/backups directory as a timestamped, zipped XML file.
api.performGroupSync	Start the process of synchronizing the system's group membership with the OS/Network/Domain's group membership. A call to this method will commence the sync process and the operation will complete in the background.
api.performUserAndGroupSync	Start a full user and group synchronization. This is equivalent to pressing the **Synchronize Now** button in the admin interface. No existing users will be removed. Whether or not full details for existing users will be updated depends on the current user/group sync settings as defined in the admin interface. A call to this method will commence the sync process and the operation will complete in the background.
api.performUserAndGroupSyncAdvanced	An advanced version of the user and group synchronization process providing control over the sync settings. A call to this method will commence the sync process and the operation will complete in the background.
api.addNewUsers	Calling this method will start a specialized user and group synchronization process optimized for tracking down and adding any new users that exist in the OS/Network/Domain user directory and not in the system. Any existing user accounts will not be modified. A group synchronization will only be performed if new users are actually added to the system.
api.getTaskStatus	Return the status (completed flag and a status message) associated with a backgrounded task such as a sync operation started by the performGroupSync API. This method returns a struct (hashtable/map) containing elements with keys `completed` and `message`. This method may be polled to determine if a sync has completed.
api.batchImportSharedAccounts	Import the shared accounts contained in the given tab separated import file (located on the server).

Method	Description
`api.batchImportUsers`	Import the users contained in the given tab-delimited import file (located on the server). See Section 6.6, “Batch User Data Import and Update” for a description of the file format.
`api.batchImportInternalUsers`	Import the internal users contained in the given tab-delimited import file (located on the server). See Section 25.1.4, “Batch Internal User Import and Update” for details of the required file format.
`api.batchImportUserCardIdNumbers`	Import the user card/ID numbers and PINs contained in the given tab-delimited import file.
`api.createUserClientAccountsFile`	Saves a file containing shared accounts data for the user client. See the manual for more information on how this feature can be used. The file will be saved on the server to the location: `[app-path]\server\data\client\client-accounts.dat` If this file already exists it will be over-written.
`api.getConfigValue`	Gets the value of a configuration settings.
`api.setConfigValue`	Sets the value of a configuration setting. NOTE: Take care updating config values. You may cause serious problems which can only be fixed by reinstallation of the application. Use the setConfigValue API at your own risk.
`api.processJob`	Takes the details of a job and logs and charges as if it were a "real" job. Jobs processed via this method are not susceptible to filters, pop-ups, hold/release queues etc., they are simply logged. See the user manual section "Importing Print Job Details" for more information and the format.

Table A.1. XML Web Services Methods

A.3.1. Web Services Example Code

The best way to demonstrate how to use the Web Services interface is using example code. Print-Limit Pro ships with example code for Java, C#, Python and Ruby located in:

```
[app-path]/server/examples/webservices/
```

The C# and Java examples also include a full documented Proxy class - a proxy is a common program design pattern. The Proxy wraps and exposes the Web Services methods as standard methods. The setup and use of the underlying XML-RPC library is all handled in the proxy class meaning you can just focus on calling the methods.

Please see the `README.txt` files in the examples directories for more information. The Java example includes full JavaDoc style documentation under `examples/webservices/java/docs/api`.

Developers using other languages such as Perl or Python will need to use an XML-RPC library to call the methods directly. All methods are exposed via the URL `http://[server_name]:9191/rpc/api/xmlrpc`.

Tip

All the XML Web Services commands are also accessible via the `server-command` program. An alternative to using a full programming environment to automate Print-Limit Pro via Web Services is to use the `server-command` program to call the commands via a script such as a batch file or shell script. This may be a simpler solution for common automation tasks such as scheduling a User/Group synchronization each night.

More information on the `server-command` program can be found in Section A.1, “Server Commands (server-command)”.

A.3.2. Security

The Web Services API's provide full access to the system's internals and hence need to be secured. Print-Limit Pro secures access using two security layers:

1. IP address level security
2. Authentication tokens - required for each method call

The IP address level security is used to control which systems, denoted by IP address, are allowed to connect to the server and call the API's. By default this is restricted to `localhost` (127.0.0.1) only. If the program/script making use of the API's resides on another system, then this system's IP address will need to be added to the list of approved addresses under **Options** → **General** → **Allowed XML Web Services callers**.

The first argument to all method calls is an authentication token (`authToken`). In the default setup the authentication token is the built-in `admin` user's password (This is password defined for the admin during the initial configuration wizard). Optionally an alternative web service authentication token may be defined via configuration - see below. This token *must* be supplied with all method calls.

To specify an alternative web service authentication token, to avoid the need to use/share the built-in `admin` user's password:

1. Login to the system.
2. Navigate to the **Options** section.
3. Click on the **Config editor** link in the list of actions.
4. Find the `auth.webservices.auth-token` config setting.
5. Enter a new value that will be the new web services authentication token.
6. Press the **Update** button to the right to apply the change.
7. This authentication token can now be used in addition to the built-in admin user's password.

A.4. SSL/HTTPS Key Generation

During the install process, Print-Limit Pro generates a self-signed key/certificate issued for the host's machine name. This key is used by default when the system is accessed via HTTPS on port 9192.

The default SSL certificate provides good security, however there are two downsides to using a self-signed certificate:

1. When users access the HTTPS site using a fully-qualified domain name, the browser will issue a "Domain mismatch warning". To avoid this warning, re-create the self-signed certificate with the machine's fully qualified domain name, see Section A.4.1, “Re-create the self-signed certificate”.
2. The browser will also warn the user that the certificate is not signed by a trusted authority. To overcome this you must obtain a certificate signed by a trusted authority, see Section A.4.2, “Using a custom signed SSL key”, or if you already have one, see Section A.4.3, “Importing an existing SSL key”.

Eliminating these warnings provides a smoother experience for the end users of Print-Limit Pro.

A.4.1. Re-create the self-signed certificate

The tool `create-ssl-keystore` can be used to re-create the key/certificate (stored in a keystore file) for a different hostname eliminating the browser domain mismatch warning. An example of the command's use:

```
cd [app-path]/server/bin/win
create-ssl-keystore -f "myserver.fullname.com"
```

More information is available via the `--help` command line option.

```
Usage: create-ssl-keystore [-f] [-k FILE] [SYSTEM_NAME]

   -f        Force. Overwrite any existing keystore file.

   -k FILE:  Define a keystore file location. If not set the keystore
             is created in the default location
             (server/data/default-ssl-keystore).

   SYSTEM_NAME: The name of the computer/server used to generate keystore.
                If not defined, the current computer name is used.
```

A.4.2. Using a custom signed SSL key

Large organizations may wish to use their own SSL key signed by a commercial certificate authority (CA) that is recognized by all popuplar web browsers including Internet Explorer, Mozilla Firefox, Safari and Chrome. A complete list can be found in Windows under Control Panel > Internet Options > Content > Certificates > Trusted Root Certification Authorities.

Some large organizations also operate a certificate authority of their own that is recognized by their users' web browsers by way of a root certificate that has been installed into all users' web browsers in a manual or automated way.

The advantage of a signed certificate is that it eliminates the browser warning, "The security certificate presented by this website was not issued by a trusted certificate authority."

If you are already in posession of a signed SSL key and certificate for the domain name of the Print-Limit Pro application server please see Section A.4.3, “Importing an existing SSL key” below.

To create your own SSL key and have it signed by a commercial or intra-organizational certificate authority you can use the 'keytool' tool supplied in the directory `[app-path]/runtime/jre/bin`.

1. Open a command prompt window and change to the directory `[app-path]/runtime/jre/bin`.
2. Enter this command to produce the SSL key:

   ```
   keytool -keystore my-ssl-keystore -alias jetty -genkeypair -keyalg RSA
   ```

   As *keystore password* choose 'password' or another simple password as it is not very important. Enter the same password again later when asked for a *key password*.

   Note: Some organizations require larger key sizes than the default 1024 bit. In this case add the "-keysize 2048" or "-keysize 4096" parameter to the end of the above command line.

   You will be asked a series of questions. Enter the exact fully-qualified domain name of the Print-Limit Pro Application Server where it asks you for "first and last name". The server name must be the exact one that users will enter into their browsers to access Print-Limit Pro's web interface, e.g. 'printing.myschool.edu'. Depending on the certification authority's requirements you may also need to fill in some of the other fields.

   ```
   Enter keystore password:  password
   What is your first and last name?
     [Unknown]:  printing.myschool.edu
   What is the name of your organizational unit?
     [Unknown]:
   What is the name of your organization?
     [Unknown]:
   What is the name of your City or Locality?
     [Unknown]:
   What is the name of your State or Province?
     [Unknown]:
   What is the two-letter country code for this unit?
     [Unknown]:
   ```

```
Is CN=printing.myschool.edu, OU=Unknown, O=Unknown,
L=Unknown, ST=Unknown, C=Unknown correct?
  [no]:  yes

Enter key password for <jetty>
        (RETURN if same as keystore password):  password
```

3. Prepare your new SSL key for certification by the certificate autority:

   ```
   keytool -certreq -alias jetty -keystore my-ssl-keystore -file jetty.csr
   ```

   The contents of the resulting `jetty.csr` can be pasted into the online order forms of abovementioned commercial certificate authorities or passed to your organization's own certificate authority. When the certification process has completed, the authority will provide you with a certificate file that can be downloaded from the autority's web site. The filename will usually end in `.crt`, `.cer` or `.cert`. The contents of the file should look something like this:

   ```
   -----BEGIN CERTIFICATE-----
   MIIDLTCCApagAwIBAgIQJc/MOTjAW0HrPI/4rGtDCDANBgkqhkiG9w0BAQUFADCB
   hzELMAkGA1UEBhMCWkExIjAgBgNVBAgTGUZPUiBURVNUSU5HIFBVUlBPU0VTIE9O
    ... more here ...
   Awjhfz9EfxN2l1UYP15xZZyNO4DO3X/LliCG9pdFf4hUHl8tRnhQBvRR1F0v9UHB
   PC6L9jNjMbQUoQ9NG/S8Nn7ZcSHNy+P53ntIBaEfTv7+qvXNWvSb5wj4pd05wGF1
   Bw==
   -----END CERTIFICATE-----
   ```

   Save the file as `jetty.crt`.

4. Before you can make use of your newly obtained certificate, you may have to import the certificate authorities "root certificate". Print-Limit comes with a number of root certificates pre-installed that you can list using this command (still from the directory `[app-path]/runtime/jre/bin` as above):

   ```
   keytool -keystore ../lib/security/cacerts -storepass changeit -list
   ```

   Add the option "-v" at the end to obtain the same list with more details, such as expiration dates.

   If your certificate authority is not listed there, or you have been notified that they have recently started using new root certificates, then you need to first import the certificate authority's root certificate into your keystore before importing your newly obtained own certificate. The CA's root certificate will usually be available for download on the CA's web site as a file ending on `.pem` or `.crt`. Save the file using a filename indicative of the CA's name, e.g. `globaltrust.pem`. Import the root certificate using this command, specifying an `alias` that is indicative of the CA's name (type this all in one line):

   ```
   keytool -keystore my-ssl-keystore -importcert -alias globaltrust
       -file globaltrust.pem
   ```

   When asked whether to trust this certificate, answer yes:

   ```
   Trust this certificate? [no]:  yes
   ```

   Some certificate authorities also provide additional "intermediate certificates" that will have to be imported the same way as the root certificate.

5. Now you can import your own certificate previously saved as `jetty.crt` (type this all in one line):

```
keytool -keystore my-ssl-keystore -import -alias jetty
    -file jetty.crt -trustcacerts
```

6. Your new keystore file `my-ssl-keystore` is now ready and should be moved to the location `[app-path]/server/custom`.

Now that you have your keystore file, follow the instructions in Section A.4.4, “Installing the Keystore” to install it and start serving up your new SSL certificate.

A.4.3. Importing an existing SSL key

If you have an existing SSL key with certificate you can import it into the Print-Limit Pro keystore. Reasons for having an existing signed key include:

- You have obtained an SSL key specifically for use with your Print-Limit Pro Application Server using a method other than using 'keytool' as described above. As a result you have – on Windows – a certificate with an attached private key either stored in the Windows certificate store or in a so-called PCKS#12 file (`*.p12`/`*.pfx`), or, – on Linux – seperate 'PEM encoded' key and certificate files.
- Your organization's intranet as served by Internet Information Server (Windows), Apache (Linux) or another web server uses a certificate that can be re-used for Print-Limit Pro. NOTE: Unless your intranet server and Print-Limit Pro run on the same server (i.e. on different ports), the server name of your intranet server will be different from your Print-Limit Pro Application Server. E.g. the intranet address might be `internal.myschool.edu` while the Print-Limit Pro Application Server can be reached at `printing.myschool.edu`. In this case the certificate can only be re-used if it is a so-called wild-card certificate that allows arbitrary subdomains under the `myschool.edu` domain name that it was issued for.

On Windows, if the certificate with key exist in the Windows certificate store only, export it:

1. Open the Windows Control Panel and open Internet Options.
2. On the "Content" tab click "Certificates".
3. On the Personal tab select the certificate and click "Export ..." and click "Next" at the initial screen
4. Select 'Yes, export the private key' and click Next
5. If you selected the last option correctly, you will only be able to export as a .PFX file
   - TICK 'Include all the certificates in the certification path if possible'
   - UNTICK 'Enable strong protection'
   - UNTICK 'Delete the private key if the export is successful'
6. Type in a password for the PFX file. This is only used temporarily.
7. Save the PFX file to with the extension `.pfx`. (This is just temporary, you MUST delete this file later on.)
8. Finish the wizard to export the certificate.

On Windows, if the certificate with key exists in the IIS Server Certificates store, export it:

1. Open the Windows management console, select your IIS server and open "Server Certificates".
2. Right-click the certificate and click "Export ...".
3. Choose a filename with the extension `.pfx`. (This is just temporary, you MUST delete this file later on.)
4. Type in a password for the PFX file. This is only used temporarily.
5. Click OK.

On Linux, if the key and certificate are in separate 'PEM encoded' files:

- Use the 'OpenSSL' tool that is part of many Linux distributions to combine both files to a PKCS#12 file with the following command (type this all in one line):

```
openssl pkcs12 -export -inkey <key file> -in <certificate file>
    -out <pfx file>
```

<pfx file> is the target PKCS#12 file for which you should choose a filename with the extension `.pfx`. (This is just temporary, you MUST delete this file later on.)

Then import the certificate into your own Print-Limit Pro keystore:

1. Open a command prompt and change to the installation directory. E.g. on Windows:

   ```
   cd c:\Program Files\Print-Limit Pro\
   ```

2. Enter the following command (type this all in one line):

   ```
   "runtime/jre/bin/java" -classpath server/lib/jetty-6.1.22.jar
       org.mortbay.jetty.security.PKCS12Import "<pfx file>"
       server/custom/my-ssl-keystore
   ```

   Substitute <`pfx file`> with the `.pfx` or `.p12` file containing your certificate and key.

   The Jetty version number (`6.1.22`) changes from time to time. If you receive a `NoClassDefFoundError` message look for a `jetty-*.jar` file in the `[app-path]/server/lib/` directory and update the command as appropriate.

3. You will be asked to enter the 'input keystore passphrase'. Enter the password that you used when you saved the file.
4. You will be asked to enter the 'output keystore passphrase'. Enter a new password such as 'password'. Once this command completes a new file should be created at `[app-path]/server/custom/my-ssl-keystore`. This file is your keystore and contains your certificate and key.
5. Now that you have your keystore file, follow the instructions in Section A.4.4, “Installing the Keystore” to install it and start serving up your new SSL certificate.

A.4.4. Installing the Keystore

The previous sections described how to create a keystore file - Section A.4.2, “Using a custom signed SSL key” for putting a new certificate from a certificate authority into a keystore, and Section A.4.3, “Importing an existing SSL key” for generating and putting your own "self-signed" certificate in a keystore. This section describes how to install your keystore so that Print-Limit can start serving up your new certificate.

To configure the Print-Limit Application Server to use the new key/certificate:

1. Copy your signed keystore onto the server running the Print-Limit Pro Application Server. The suggested location is `[app-path]/server/custom/my-ssl-keystore`
2. Open the file `[app-path]/server/server.properties` with a text editor (e.g. Notepad).
3. Locate the section titled `SSL/HTTP Configuration`.
4. Remove the # (hash) comment marker from all lines starting with "`server.ssl`".
5. Define the location of your keystore, keystore password and key password as chosen previously. The file should look something like this:

   ```
   server.ssl.keystore=custom/my-ssl-keystore
   server.ssl.keystore-password=password
   server.ssl.key-password=password
   ```

   NOTE: On Mac OS please specify the FULL path to your keystore, e.g. `/Applications/Print-Limit`

`Pro/server/custom/my-ssl-keystore`

6. Restart the Print-Limit Pro Application Server and verify all is working. If the server fails to start, error messages will be recorded in logs located in the server's `logs` directory.

A.5. User Client Options

The user client is used to display user balances, system notifications and request information from the users. This is discussed in more detail in Section 5.2, “User Client”. The user client implements a number of command-line options that change it's behavior.

Option	Description
`--silent`	The silent option tells the client not to report errors if it has problems connecting to the server. If the server is unavailable at time of startup (e.g. the client is not connected to the network), or if the user does not currently exist in the database, the client will simply sleep waiting for the condition to change. This option can also be set by adding a `silent=Y` line to the client `config.properties`.
`--debug`	The debug option tells the client to log activity to a file called user-client.log which will be created in the user's home directory. This option can also be set by adding a `debug=Y` line to the client `config.properties`.
`--minimized`	The minimized option tells the client to start minimized. On windows the client will be minimized to the task tray. This option is recommended if the user's balance is not important to the user. For example, if a user is only allowed to assign print jobs to a shared account, then their personal balance is of little importance, so the user client should be minimized. This option can also be set by adding a `minimized=Y` line to the client `config.properties`.
`--noquit`	Stops the user from closing or quitting the client where possible. This option can also be set by adding a `noquit=Y` line to the client `config.properties`.
`--disabletasktrayicon`	The option tells the client to hide the task tray icon. This option can also be set by adding a `disabletasktrayicon=Y` line to the client `config.properties`.
`--disable-balloon-tips`	This option instructs the client to display messages in dialog boxes rather than notification area balloon tips. (Windows only) This option can also be set by adding a `disable-balloon-tips=Y` line to the client `config.properties`.
`--hide-balance`	This option instructs the client to hide the user balance. On Windows the balance window is not displayed. On other platforms the balance is hidden from the balance window. This option can also be set by adding a `hide-balance=Y` line to the client `config.properties`.
`--user <username>`	The user option allows the client to be run using a different username. This can be useful if the user is logged into a machine with a different username than he or she is authenticated to the server/printers as. For example, if a user is using a laptop that is not a part of the domain. This option can also be set by adding a `user=<username>` line to the client `config.properties`.
`--cache <cache directory>`	This argument is actioned by `pc-client-local-cache.exe`. It defines the location of the globally writable cache directory on the system's locale hard drive. The cache is used to minimize network traffic on future launches. The default location is `C:\Cache`. Standard users will require *WRITE* and *READ* access to this directory.
`--neverrequestidentity`	The client will use the username of the logged in user to identify itself with the server. In a domain environment, users always login using their network identity

Option	Description
	and the names will always match. However on non-domain systems where local accounts are used (e.g. Laptops), these names may not match. The client will display a popup requesting the user to confirm their identity. This option will suppress this dialog. This option can also be set by adding a `neverrequestidentity=Y` line to the client `config.properties`.
`--windowposition <position>`	Specify where the client window should appear. The valid options include `top-left`, `top-right`, `bottom-left` or `bottom-right`. In addition to the above set of fixed positions, co-ordinates of the window can also be specified by setting the `<position>` parameter to `XY<x>,<y>`. The `<x>` value sets the x co-ordinate of the window (if negative the value indicates the distance from the right of screen). The `<y>` value sets the y co-ordinate of the window (if negative the value indicates the distance from the bottom of screen). Some examples include: • `XY100,100` - position the window 100 pixels from the left and 100 pixels from the top of the screen. • `XY-50,100` - position the window 50 pixels from the right and 50 pixels from the top of the screen. • `XY50,-100` - position the window 50 pixels from the left and 100 pixels from the bottom of the screen. The window position can also be set by adding a `windowposition=<position>` line to the client `config.properties`.
`--windowtitle <title>`	Allows the window title to be customized. If the `<title>` includes `{0}` then this will be replaced by the user's username. The window title can also be set by adding a `windowtitle=<title>` line to the client `config.properties`.
`--background-color <color>`	Changes the background color of the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set the background color to red, use: `--background-color=FF0000` The balance window background color can also be set by adding a `background-color=<color>` line to the client `config.properties`.
`--text-color <color>`	Changes the text color of the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set the text color to blue, use: `--text-color=0000FF` The balance window text color can also be set by adding a `text-color=<color>` line to the client `config.properties`.
`--link-color <color>`	Changes the color of the link on the client's balance window. The colors are coded in standard hexadecimal RGB ("web colors", see http://en.wikipedia.org/wiki/Web_colors for an explanation). E.g. to set the link color to a dark gray, use: `--link-color=333333` The balance window link color can also be set by adding a `link-color=<color>` line to the client `config.properties`.
`--default-selection <option>`	Specifies the default selected option on the account selection popup. This option can be used to save mouse clicks / keyboard presses by setting the default selected option to the one that is most commonly used. Options include: • `charge-personal` - The "Charge to my personal account" option is selected. • `charge-account-list` - The "Charge to shared account" option is

Option	Description
	selected. • `charge-account-pin` - The "Charge to shared account using PIN / Code" option is selected. • `print-as-user` - The "Perform print as user" option is selected. For example, applying a default selection of `charge-account-list` ensures that the option **Charge to shared account** is selected, and the dropdown list of accounts is highlighted. This allows the user to begin navigating the list of shared accounts immediately via the keyboard, and saves them having to select the option first. This option can also be set by adding or enabling the `default-selection=<option>` line in the client `config.properties` file.
`--default-account <option>`	Specifies the default selected account on the account selection popup. This option can be used to save mouse clicks / keyboard presses by setting the default selected account to the one that is most commonly used. NOTE: The default shared account can also be set on the user's account selection options. See Section 8.4, “The Account Selection Popup”. For example, setting the default account to "sales\invoices" results in this account being selected when the account selection popup shows. This allows the user to quickly confirm the selection by just clicking OK in those cases that the print should be charged to this account. The selection can still be changed in case the print should not be charge to this account. This option can also be set by adding or enabling the `default-account=<option>` line in the client `config.properties` file. If set this overrides the default account setting on the user's account selection options.
`--default-account-pin <option>`	Specifies the default account pin entered on the account selection popup. This option can be used to save typing by setting the default account pin to the one that is most commonly used. Without this option, the account pin field on the account selection popup shows the account pin last entered in this field. If the option is specified but left blank (`--default-account-pin ""`), the account pin field will be blank on every popup. This option can also be set by adding or enabling the `default-account-pin=<option>` line in the client `config.properties` file.
`--accounts-file <account-file-path>`	Specifies the location of the local accounts file to load. For more information, see Section D.3, “Managing Large Client Account Lists on Distributed Sites”.
`--auth-ttl-values <ttl-value-mins>`	Comma separated list of authentication ttl values in minutes. This overrides the values configued on the server. See Section 7.10, “Popup Authentication”. This option can also be set by adding or enabling the `auth-ttl-values=` line in the client `config.properties` file.
`--auth-ttl-default <default-mins>`	The default time-to-live value automatically selected when the login authentication window displays. This overrides the values configued on the server. This option can also be set by adding or enabling the `auth-ttl-default=` line in the client `config.properties` file.

Table A.2. User Client command-line options

The command-line arguments listed above are usually used in the area/method used to start the client - a login script, shortcut, or the relevant registry key in `HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Run\`.

The command-line arguments may also be set in the `config.properties` file. This is particularly helpful on Apple Mac systems where command-line arguments are difficult to implement. The `config.properties` file is located in the same directory as the client executable on Linux and Windows. On the Mac it can be found at:

```
[app-path]/PCClient.app/Contents/Resources/config.properties
```

Additionally settings may be changed at the user-level by placing a file in the user's Library Preferences folder located at:

```
~/Library/Preferences/PCClient/config.properties
```

The file should contain the options in a properties file form like:

```
user=mary
minimized=Y
windowposition=top-left
windowtitle=Print Balance: {0}
```

- *Changing the time after which jobs are deleted when awaiting popup response*

  If a user does not respond to the account selection popup after a defined time, their print job will be automatically deleted. This is to prevent a buildup of old jobs in the print queue. The default timeout is `10` minutes, and can be changed as follows:

  1. Navigate to the **Options** tab
  2. In the section **Client Software**, find the option **Delete jobs awaiting popup response after...**
  3. Enter the number of minutes to wait for users to respond to the popup before their job is deleted
  4. Press **Apply**

A.6. Stopping and Starting the Application Server

Most of the time it will not be necessary to stop or start the server; however there are some circumstances where this is required:

- Performing an offline backup
- Upsizing the database to an external database
- Upgrading the application

The procedure for stopping the server depends on the platform the server is run on.

Important

When you start the application server, wait approximately 15-20 seconds for the service to start before accessing the admin interface. This gives the system time to initialize.

A.6.1. Stopping and Starting the Application Server on Windows

The Print-Limit Pro application server runs as a Windows service when installed on Windows, and it can be stopped and started using the Services control panel applet. To stop/start/restart the application server:

1. Open the services control panel. (**Start** → **Control Panel** → **Administrative Tools** → **Services**)
2. Find the service named **Print-Limit Application Server**.
3. Right-click on the service.
4. Select the option you want to perform (e.g. Stop/Start/Restart).

An alternative to using the services applet is to run the batch files located in the directory `[app-path]\server\bin\win`. Using the batch files might be more convenient when the process needs to be

automated (like scripting a database backup). The batch files to stop/start the server are called:

- `start-server.bat` - starts the service
- `stop-server.bat` - stops the service

A.6.2. Stopping and Starting the Application Server on Mac

The Print-Limit Pro application server may be stopped or started on Mac by using the following scripts found at `[app-path]/server/bin/mac/`:

- `start-server.command` - starts the application server
- `stop-server.command` - stops the application server

A.6.3. Stopping and Starting the Application Server on Linux

The Print-Limit Pro application server may be stopped or started on Linux by using the following scripts found at `[app-path]/server/bin/linux-[x64|i686]/`:

- `start-server` - starts the application server
- `stop-server` - stops the application server

A.7. Automating / Streamlining Installation on Windows

In some cases organizations may wish to streamline the installation of Print-Limit Pro or a particular Print-Limit Pro component for automating deployment. For example when installing on many secondary print servers, or installing the user client tool locally on many desktops (although the recommended installation procedure is the "zero install" strategy - see Section 5.2.1, “User Client Deployment”).

The installer command-line options provide the ability to pre-select the installer options, such that there is no need to click through them when installing. The options in table Table A.3, “Windows installer command-line options” are valid for the Windows installers for Print-Limit Pro (the main installer), the user client tool and the card wizard.

Option	Description
`/SILENT` or `/VERYSILENT`	Instructs the installer to be 'silent' or 'very silent'. When silent the installation begins immediately, and only the progress window is displayed. When very silent, installation begins immediately with nothing displayed. If any errors are encountered, the error messages are still displayed with either option.
`/DIR="x:\dirname"`	Overrides the default installation directory. This can be used to install Print-Limit Pro to a different directory than the default.
`/TYPE=secondary_print`	Selects the install type/options: Server installer: • `full` - The Print-Limit Pro server. The default option. • `secondary_print` - Install option to set up a secondary print server. Only installs the print provider component.
`/GROUP="folder name"`	Overrides the default Start menu group / folder into which Print-Limit Pro is installed.
`/NOICONS`	Disables the creation of a Start menu group / folder.
`/LANG=language`	Specifies the language to use during installation. By default this is automatically detected based on your language settings, but can be overridden by specifying a language. The available languages are: • `de` - German • `en` - English • `es` - Spanish • `fi` - Finnish

Option	Description
	• `fr` - French • `it` - Italian • `nl` - Dutch • `pt` - Portuguese • `pt_BR` - Brazilian Portuguese • `zh_CN` - Chinese (Simplified) • `zh_HK` - Chinese (Traditional) *Note:* This option only specifies the language during installation. More languages and regional options are available in Print-Limit Pro once installed, which are configured separately.

Table A.3. Windows installer command-line options

A.8. Importing Print Job Details

In some environments it may be desirable to import print jobs that have been tracked by external or third party systems into Print-Limit Pro. This could be because the external system is not easily tracked directly, or to import data that was previously tracked for logging and reporting purposes.

Job details may be importing using the `server-command` scripting tool (`process-job` command, see Section A.1, “Server Commands (server-command)”) or using the web services API (`api.processJob` call, see Section A.3, “The XML Web Services API”). To import multiple jobs in a batch, run the command/call multiples times (e.g. via a script or program).

The server-command and web services call accept a single argument (string) containing all the job details. Each field is specified as a name-value pair separated by an equals sign (i.e. `name=value`), and fields are separated by commas.

For example, to process a job and specify the user, printer server and printer name (the minimum required details):

```
user=bob,server=printlimit,printer=My Printer
```

If any fields contain a comma, surround the name-value pair with quotation marks ("). E.g. for a printer named `Library, rear`:

```
user=bob,server=printlimit,"printer=Library, rear"
```

Spreadsheet applications such as Excel with automatically add quotation marks as above when saving a document in CSV format.

If any fields contain quotation marks, escape them by adding another quotation mark, i.e. two in a row. E.g. for a printer named `"John Smith" Library`:

```
user=bob,server=printlimit,printer=""John Smith"" Library
```

The names of all the available fields are listed in the table below.

Field	Required	Description	Default
user	Yes	The username of the user associated with the job.	N/A
server	Yes	The name of the server the job was submitted to.	N/A
printer	Yes	The name of the printer or print queue the job was submitted to.	N/A
time	No	The time the job was submitted/printed. This is formatted as an ISO8601 simple date-time:	(current time)

Field	Required	Description	Default
		yyyyMMddTHHmmss. E.g. "20091224T133602" represents the 24th of December 2009 at 13:36:02 (1:36 pm, local time).	
cost	No	The cost of the job. If the cost is not set it will be automatically calculated as for a normal job (based on the job details and configuration of the printer, user etc.).	(auto)
total-pages	No	The total number of pages in the job.	1
total-color-pages	No	The total number of color pages in the job.	(same as total-pages)
copies	No	The number of copies in the job.	1
document-name	No	The document name.	(empty)
duplex	No	TRUE or FALSE to indicate if the job is duplex (printed on both sides)	FALSE
grayscale	No	TRUE or FALSE to indicate if the job is grayscale (no color)	FALSE
paper-size-name	No	The name of a standard paper size, e.g. "Letter" or "A4".	(empty)
paper-width-mm	No	The width of the paper in millimeters. Determined automatically if using paper-size-name.	(empty)
paper-height-mm	No	The height of the paper in millimeters. Determined automatically if using paper-size-name.	(empty)
document-size-kb	No	The size of the document's spool file in kilobytes.	0
invoice	No	TRUE to mark the job as invoiced, FALSE to mark as not invoiced. The default value is determined automatically, as for a regular job.	(auto)
comment	No	A comment to be associated with the job.	(empty)
client-machine	No	The hostname of the client machine the job was submitted from.	(empty)
client-ip	No	The IP address of the client machine the job was submitted from.	(empty)
shared-account	No	The name of the shared account to charge this job to. Sub-accounts may be selected using a backslash, i.e. "parent\child".	(empty)

Table A.4. Fields for Importing Print Job Details

Appendix B. Troubleshooting & Technical FAQ's

There are a number of problems you may run into in the course of installing and using Print-Limit Pro. Many will be resolved once you get a better idea of how Print-Limit Pro works, while others may require you to dig deeper into the application's workings.

In addition to this section, some platform specific FAQ's are available at Section 21.7, “Linux FAQ”.

B.1. Troubleshooting & Installation Questions

Q:

I am running Print-Limit Pro server on Windows XP Professional. Is this supported?

A:

Yes, Print-Limit Pro server is supported on Windows XP Professional. It is recommended that you disable **Simple File Sharing**. This feature causes Windows XP to authenticate all users as **Guest**, which causes two problems:

- All printing is recorded as being printed by the **Guest** user.
- Username/password authentication does not work correctly, because Windows XP will authenticate as **Guest**, even if the username/password is entered incorrectly.

To disable **Simple File Sharing**, open Windows Explorer, select **Tools** → **Folder Options...**, and un-tick the appropriate option on the **View** tab.

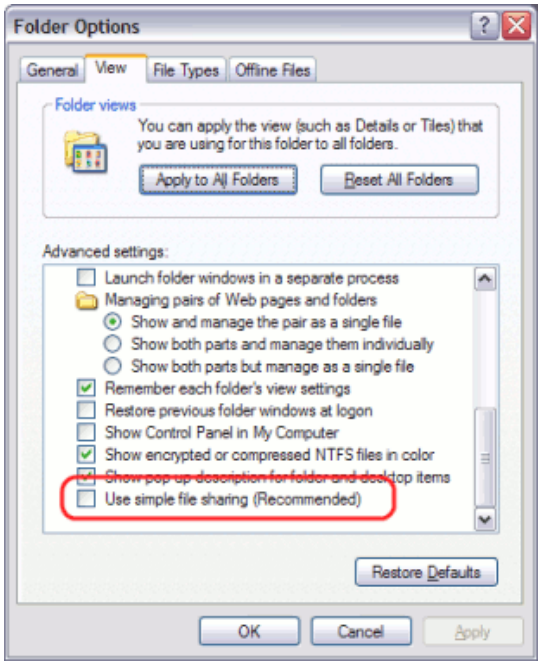

Folder Options
General
View
File Types
Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Launch folder windows in a separate process
Managing pairs of Web pages and folders
Show and manage the pair as a single file
Show both parts and manage them individually
Show both parts but manage as a single file
Remember each folder's view settings
Restore previous folder windows at logon
Show Control Panel in My Computer
Show encrypted or compressed NTFS files in color
Use simple file sharing (Recommended)
Restore Defaults
OK
Cancel
Apply

Figure B.1. Disable simple file sharing

Q:

I am running Print-Limit Pro in a workgroup environment (i.e. not as part of a domain). What considerations should be taken into account?

A:

See Chapter 24, *Running in a Workgroup Environment*.

Q:

Print-Limit Pro is not detecting jobs printed from a network clients. How can I fix this?

A:

There are two main causes of this problem:

- Users are not correctly logging on to your network domain or computer. If the domain server does *NOT* authorize users, Print-Limit Pro has no way of knowing who submitted the print job. With system policies, login onto the domain can be made mandatory, eliminating this problem. Alternatively printer permissions can be set on the print server to ensure only valid users may print to the printers.
- Alternatively the client computer may be configured to print directly to the network interface printer. Ensure all network clients are configured as outlined in the Print-Limit Pro installation guide. All print jobs must pass through the print server running Print-Limit Pro.

Q:

Print-Limit Pro is not counting/detecting pages correctly. What's causing this?

A:

Print-Limit Pro currently supports about 90% of printers on the market. If a printer's language is not recognized, Print-Limit Pro will not detect any pages and record the print job as a zero page count. This is usually accompanied with an error message in the Application Event Log. We recommend you try the following problem resolution actions in this order:

1. Many printers come with a variety of driver options. Install the *Postscript* drivers if one is available for the printer. Do this on both the Print Server and all network clients.
2. Try the drivers included with the Windows CD. Print-Limit Pro supports the majority of drivers distributed with recent Windows releases.
3. Try turning **Enable advanced printing features** as follows:
    a. On the *print server*, Start->Settings->Printers.
    b. *Right-click* on the printer and select **Properties...**
    c. Select the **Advanced Tab**.
    d. Turn *off* (disable) the **Enable advanced printing features**.
4. If you're still having problems, email Netop support. The development team may be able to recommend a suitable set up or even supply a recent update supporting your hardware.

Q:

How do I ignore (not monitor or delete) a printer?

A:

The *Print Provider* may be configured via its configuration to ignore a printer. For more information see Section 7.1, “Adding and Removing/Deleting/Ignoring Printers”.

Q:

The system is not displaying the correct currency sign.

A:

Print-Limit Pro will format the currency based off the operating system's default regional settings. If the default regional settings are incorrect, the format can be changed by defining your location under **Options** → **General** → **Display Settings** → **Location**.

Q:

I've setup a secondary print server. The printers on this server are not listed and not being monitored. What's wrong?

A:

There are a number of possible explanations. The first step is to open the Print Provider's log file on the secondary server. This file will often contain error messages indicating the cause or type of error. On a Windows system the log file is located at: `[app-path]\providers\print\win\print-provider.log` The file can be opened from any text editor such as Notepad.

Some common issues are:

1. Verify that the secondary server's name is correctly defined in the `print-provider.conf` file. Open a command prompt on the secondary server and use the `ping` command to verify that the server can be contacted under this name. A server restart (or a manual restart of the Print-Limit Print Provider service) is required for any changes to the file to take effect.
2. Ensure that firewall software on the primary server is not preventing the secondary server from connecting on port 9191. Firewalls should be configured to allow all local network traffic on this particular port.

   A quick way to see if the secondary server can connect to the primary server is to use the command-line `telnet` program. Simply type: `telnet servername 9191` at a command prompt.

   - If you receive an error like `Could not open connection to host`, then there is probably a network/firewall issue not letting the connection through.
   - If the screen goes blank then the connection was established successfully. Press `Ctrl+]` then type `quit` to close the telnet session.
3. Check that the *Print Provider* process/service is in fact installed and running. On a Windows system this is located under: **Start** → **Control Panel** → **Administrative Tools** → **Services**

Q:

The client software is not displaying the user's account balance and is displaying a network error. How do I fix this?

A:

The client software needs to contact the application server. For the technical readers, the client makes an XML web services request to the server on port 9191. Most problems relate to either firewalls blocking access or the application server's name is not correctly defined. Ensure that:

1. Any firewalling software on the server allows local network access to port 9191.
2. The `client.properties` file (a text file) lists the correct server name or IP address of the server. If you've used the zero-install deployment option, this file is located on the server in the directory: `[app-path]/client/client.properties`

B.2. General Questions

Q:

How do I change the built-in `admin` user's password?

A:

The `admin` user's password is set up on initial install during the configuration wizard. This password can be changed post-install by logging into the application as the `admin` user and navigating to the **Options** → **Advanced** tab, and selecting the **Change internal admin password** option.

If you have forgotton the internal admin password, it can be reset by editing the `admin.password` property in the text file located at `[app_dir]/server/server.properties`.

Q:

I run a small peer-to-peer network and my users don't log onto the workstations. Can I still use Print-Limit Pro?

A:

Print-Limit Pro is primarily designed for networks managed under a domain and/or authenticated environments. Peer-to-peer networks or Workgroups are however supported. The first option should be to consider requiring users to log onto the workstations using their username and password. If this is not possible, an alternate option is to set up the user accounts on system hosting the printers (system running the Print-Limit Pro server software) and configuring the account selection popup with the **Charge to other users option selected**. Users can then enter their username and password in the popup that displays each time they print.

Q:

I would like to start the user inquiry tool (client software) with the window minimized. Is this possible?

A:

Yes. The client software can be started minimized by executing the program with a command-line switch `-minimized`. See Section A.5, “User Client Options”.

Q:

How do I stop users from closing/shutting down the client software?

A:

If the user running the client software is configured to either:

- select shared accounts
- confirm the print job via a popup

the client software must be running at all times. If the user is configured in either of these modes, the client software's exit option is disabled. *Note:* The client software will need to be restarted to pick up this option after the user's options have been changed.

Q:

Why does Print-Limit Pro cache the group membership?

A:

Print-Limit Pro caches group membership by replicating the user/group relationship structure internally in the system. Typically network group membership is relatively static, and is usually set up when a user account is initially created. Print-Limit Pro tries to be a good network application by avoiding common no-no's such as flooding domain controllers with group lookup requests. This is achieved by caching. Operations such as **Bulk user operations**, quota allocations, group reports and group filtering all need to do group membership lookups. Caching speeds up these operations and prevents excessive callouts to the domain servers.

The downside to caching is that group membership changes are not immediately reflected inside Print-Limit Pro. To force Print-Limit Pro to detect the change perform a User/Group synchronization under the Options section. The system will also automatically refresh group membership overnight during low network activity.

Q:

I have noticed a lot of extra options available under the Config Editor (Advanced) area. Can I change these?

A:

The config area contains all of the Print-Limit Pro system wide settings. Some of these can be changed via the normal options interface while others are designed for internal developer use and tuning and are only accessible via the config editor. Any changes made in the config editor should be done with care as an invalid entry may require you to reinstall the system!

Q:

I'd like to write some custom extensions. Do you support this?

A:

The development team may be able to assist with detailed API documentation and source code. If you would like feedback on your ideas, please email our support team.

Q:

What external databases are supported?

A:

Running Print-Limit Pro on top of an external database is an advanced option. This is discussed in details in system management section.

Q:

What is the internal database format?

A:

Print-Limit Pro's internal database is Apache Derby - an open source database written by IBM and based on IBM's DB2 Cloudscape database system. The internal database has proven to scale very well and is suitable for networks of all sizes.

Q:

What language is Print-Limit Pro developed in?

A:

Print-Limit Pro is developed under a number of languages and development environments. The printer monitoring component and other native operating system interfaces such as user authentication are written in C/C++. The application server and web services are written in server-side Java.

Q:

I'd like to investigate server cluster support?

A:

The Print-Limit Pro is designed as a cluster compatible application and supports clustering at all layers of the application. For more information on configuring Print-Limit Pro in a Microsoft Cluster environment, please see Chapter 20, *Clustering and High Availability*. If you'd like to investigate clustering options on other platforms (Linux) please contact our support team.

Appendix C. Advanced LDAP Configuration

Print-Limit Pro supports the following LDAP server types out-of-the-box:

- Novell eDirectory
- Microsoft Active Directory
- Unix/NIS/Posix

and basic configuration options for these platforms/environments are discussed at Section 12.3.9, “Using LDAP for user synchronization”.

However, other server/schema types can be supported by defining the fields to query and the LDAP searches to perform. These options are configured by adjusting config entries in the **Config Editor**, which can be opened from the **Options** tab. The following config items are available:

Config name	Description
ldap.schema.user-name-field	The LDAP field that contains the user's username.
ldap.schema.user-full-name-field	The LDAP field that contains the user's full name.
ldap.schema.user-email-field	The LDAP field that contains the user's email address.
ldap.schema.user-department-field	The LDAP field that contains the user's department.
ldap.schema.user-office-field	The LDAP field that contains the user's office location.
ldap.schema.user-name-search	The LDAP search to retrieve the user. The `{0}` in the search is replaces with `*` when listing all users, and `[username]` when searching for a specific user. If no search is defined, the default is `([userNameField]={0})`.
ldap.schema.group-name-field	The LDAP field that contains the group's name.
ldap.schema.group-member-field	The LDAP field that contains the group members.
ldap.schema.group-search	The LDAP search to retrieve the group. The `{0}` in the search is replaced with `*` for all group searches. If no search is defined, the default is `([groupMemberField]={0})`, which means get all entries with at least one member.
ldap.schema.posix-groups	If `Y`, then the group member field contains the user's username. If `N`, then the group member field contains the user's DN.

Table C.1. LDAP Config entries

C.1. LDAP Server Default Configuration

When a particular LDAP server type is selected (e.g. Novell eDirectory), Print-Limit Pro uses the following defaults to query the LDAP server. These defaults can be used as a starting point for customizing the LDAP searches or for supporting other server types.

C.1.1. Standard (Unix / Open Directory)

If the LDAP server is configured to support Unix based authentication then this schema type can be used. The following defaults are used.

Config name	Default value
ldap.schema.user-name-field	`uid`

Config name	Default value
ldap.schema.user-full-name-field	`cn`
ldap.schema.user-email-field	`mail`
ldap.schema.user-department-field	`departmentNumber`
ldap.schema.user-office-field	*[not set]*
ldap.schema.user-name-search	`(uid={0})`
ldap.schema.group-name-field	`cn`
ldap.schema.group-member-field	`memberUid`
ldap.schema.group-search	`(memberUid={0})`
ldap.schema.posix-groups	`Y`

Table C.2. Unix / Open Directory LDAP default settings

C.1.2. Novell eDirectory Defaults

If the LDAP server is a Novell eDirectory then the following defaults are used.

Config name	Default value
ldap.schema.user-name-field	`cn`
ldap.schema.user-full-name-field	`fullName`
ldap.schema.user-email-field	`mail`
ldap.schema.user-department-field	`OU`
ldap.schema.user-office-field	`l`
ldap.schema.user-name-search	`(&(cn={0})(objectClass=person))`
ldap.schema.group-name-field	`cn`
ldap.schema.group-member-field	`member`
ldap.schema.group-search	`(&(member={0})(objectClass=groupOfNames))`
ldap.schema.posix-groups	`N`

Table C.3. Novell eDirectory LDAP default settings

C.1.3. Microsoft Active Directory Defaults

If the LDAP server is a Microsoft Active Directory then the following defaults are used.

Config name	Default value
ldap.schema.user-name-field	`sAMAccountName`
ldap.schema.user-full-name-field	`displayName`
ldap.schema.user-email-field	`mail`
ldap.schema.user-department-field	`department`
ldap.schema.user-office-field	`physicalDeliveryOfficeName`

Config name	Default value
ldap.schema.user-name-search	`(&(sAMAccountName={0})(objectCategory=person)(objectClass=user)(sAMAccountType=805306368))`
ldap.schema.group-name-field	`sAMAccountName`
ldap.schema.group-member-field	`member`
ldap.schema.group-search	`(&(member={0})(objectCategory=group))`
ldap.schema.posix-groups	`N`

Table C.4. Active Directory LDAP default settings

Appendix D. Capacity Planning

This section discusses capacity planning considerations to allow administrators to plan future infrastructure requirements and make decisions about how to deploy the application.

Print-Limit Pro is designed to be self-maintaining, however it is important that the administrator understands the disk-space requirements and how this changes overtime.

D.1. Database Sizing and Growth

The most important part of capacity planning for Print-Limit Pro is the size and growth of the underlying database. All other aspects of the system manages itself, but care must be taken to ensure there is enough disk space to hold the growing database.

The size and growth of the database depends on the database being used. Each database uses a different format to store their data, therefore the growth characteristics of databases will differ. This section outlines the database growth characteristics of:

- The internal database (Apache Derby)
- Microsoft SQL Server

For more information on running Print-Limit Pro on external databases, see Chapter 18, *Deployment on an External Database (RDBMS)*.

Database growth is very dependent on the usage patterns and therefore differs significantly from site to site. The best way to predict database growth is based on the rate of print jobs performed. Although, there is some overhead for other data (like users, groups, printers, etc.), this data is static and does not grow over-time. The majority of database growth is caused by print and transaction logs.

The growth calculations performed below provide an indication of growth per 1000 or 10000 print jobs. Then using these numbers and your estimate of the rate of printing in your organization a growth estimate can be made. See Section D.1.3, “Sample database growth calculation” for an example of this calculation.

D.1.1. Internal database growth

Most Print-Limit Pro installations use the internal database. This database is suitable for most organizations, however some prefer to run using an external database (as discussed in Chapter 18, *Deployment on an External Database (RDBMS)*).

The following graph shows the database size increase with the number of print jobs.

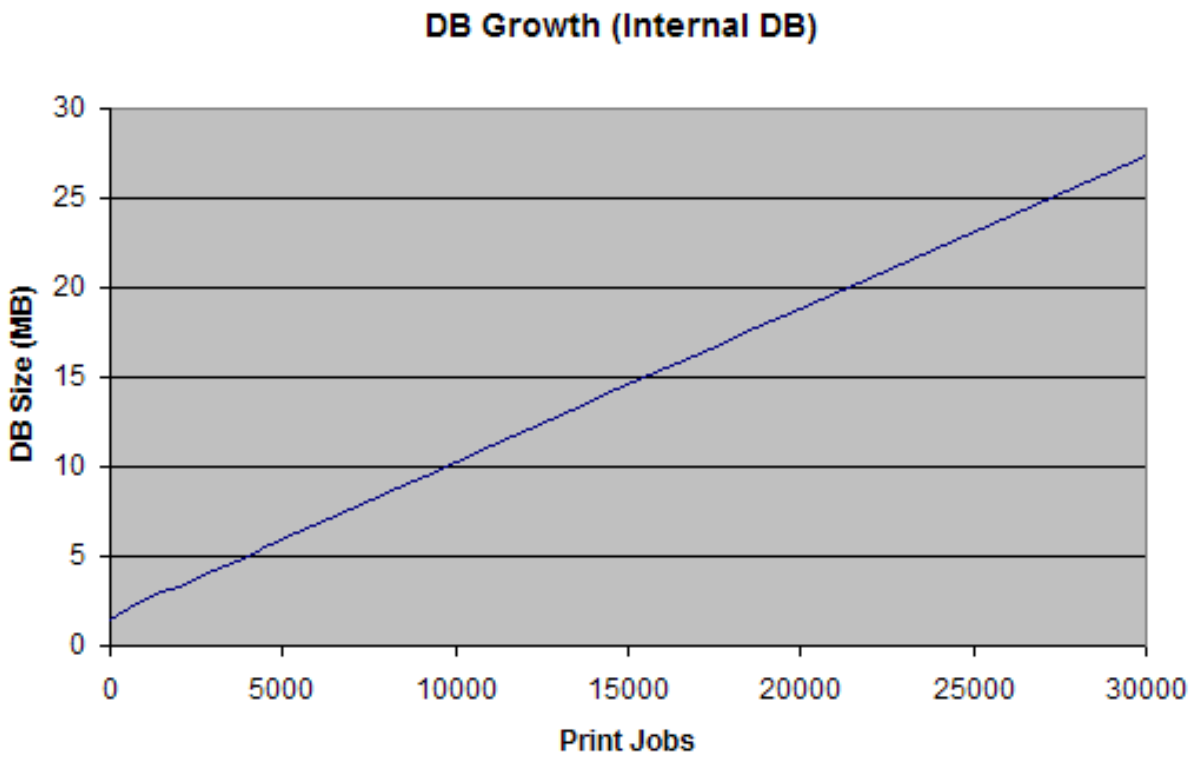


Figure D.1. Database growth using the internal database

These results show that the internal database grows by approximately 8.5MB per 10,000 print jobs.

D.1.2. SQL Server database growth

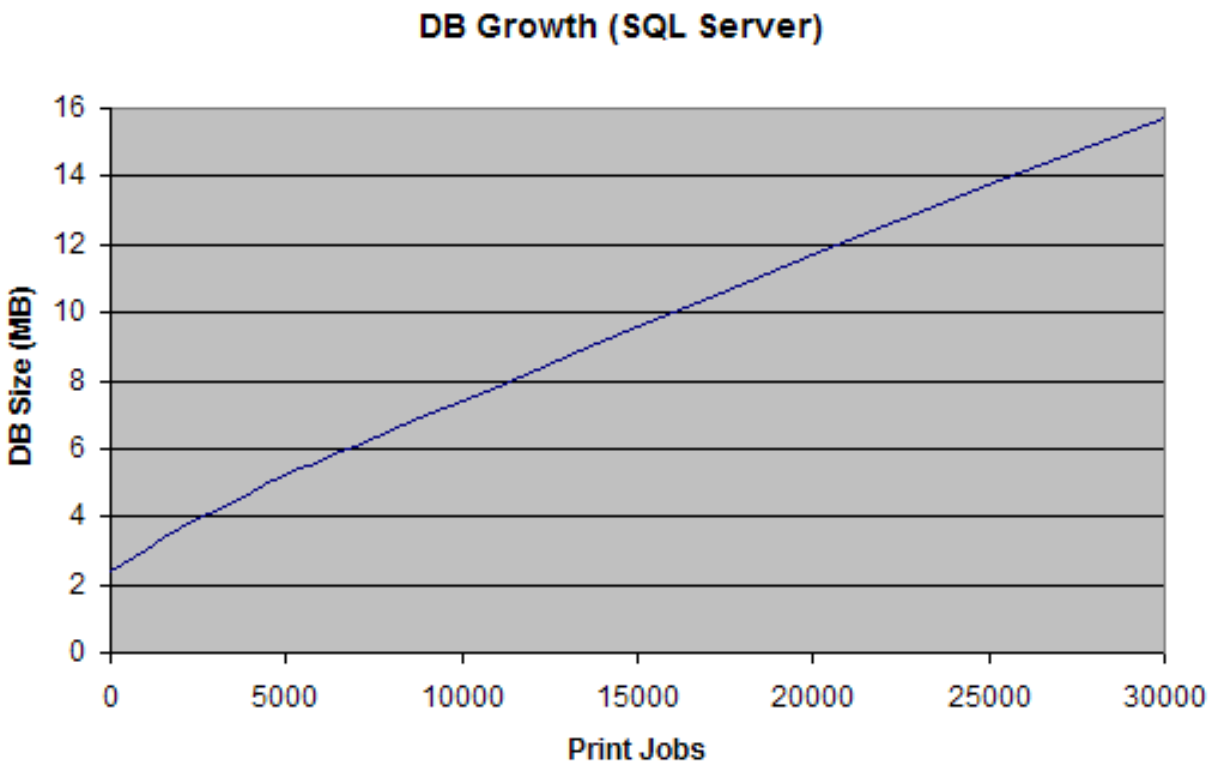


Figure D.2. Database growth using a Microsoft SQL Server database

These results show that a Microsoft SQL Server database grows by approximately 4.5MB per 10,000 print jobs.

D.1.3. Sample database growth calculation

This section provides a sample of how to estimate the database growth for your environment. To perform this calculation we need to make a number of assumptions. These assumptions should be adjusted to suit your organization. The assumptions are:

- 1 print job per user per day
- 20 working days in a month
- Therefore, 20 print jobs per user per month

Here is a sample database growth calculation based on a 500 user site using the internal database:

1. Calculate the total number of print jobs expected for the month. (i.e. the total number of users multiplied by the number of print jobs). 500 * 20 = 10,000. So in this example, Print-Limit Pro is handling 10,000 print jobs a month.
2. Calculate the monthly growth rate by dividing the jobs per month by 10,000 and then multiplying by the database growth rate (i.e. for the internal DB this is 8.5MB for 10,000 jobs). So, 10,000 / 10,000 * 8.5 = 8.5MB/Month. Therefore in this situation the internal database will grow by approximately 8.5MB per month.
3. To estimate the growth per year, multiply the above by 12. Therefore in this situation, the database will grow by 10.2 * 12 = 122.4MB per year.

D.2. Network Bandwidth Planning

With modern switched Ethernet networks, bandwidth is rarely a factor when planning Print-Limit Pro deployments. The bandwidth consumed by Print-Limit Pro is usually dwarfed by the print document data - e.g. the Postscript spool data sent across the network. Bandwidth does however become a consideration when planning deployments crossing physical site boundaries such as networks linked via a WAN.

Print-Limit Pro uses an XML based web services protocol for communication between client-to-server and server-to-server. This protocol is very bandwidth efficient and designed to work well on low bandwidth and high latency networks.

D.2.1. Bandwidth Estimates

Bandwidth consumption can be summarized as follows:

D.2.1.1. Server-to-Server

Other than normal print server traffic (standard job spooling), Print-Limit Pro will generate XML-RPC based Web Services based traffic on port 9191. Connections are made from the print server to the main Print-Limit Pro server (Primary Server). Normal activity is around 1-2kb of traffic for for each print job. Connections are instigated from the secondary server. Network packets are only sent during printing activity.

D.2.1.2. Client-to-Server

Connections are instigated by the client inbound to the server on port 9191 and 9192 (Encrypted SSL). While at idle, the client consumes a few bytes once every minute (a keep-alive heartbeat). During print activity, up to 1-2kb per print job may be consumed depending on client popup settings.

If using account selection popups, the client must download the latest account list from the server whenever it is updated. The accounts are downloaded in a very efficient compressed format (approximately 20 bytes per account). If you have 10's of thousands of accounts, and many clients running on remote sites with limited bandwidth, please see Section D.3, “Managing Large Client Account Lists on Distributed Sites”.

D.3. Managing Large Client Account Lists on Distributed Sites

When using the print account selection dialogs, the user client displays a list of client accounts for the user to choose from. This account list is downloaded from the server whenever the account list is updated (i.e. new accounts added). The accounts are downloaded in a very efficient compressed format (taking approximately 10-20 bytes per account). This works very well on the vast majority of sites that have less than 10,000 accounts and are running on fast network connection.

On sites that have 10's of thousands of accounts and many workstations on remotes with bandwidth-limited WAN connections the accumulated bandwidth usage could be significant. To reduce this bandwidth usage, the clients can be configured to load the accounts from a file stored locally at each site. When the accounts are updated on the server, the file can be re-copied to each site. This distributes the client account list to all users at a site by sending the account list over the network only once, instead of one copy per workstation/client.

The process works as follows:

1. On the server the administrator sets up a scheduled task to run the server command to generate the client accounts file as follows:

   ```
   server-command create-user-client-accounts-file
   ```

   This creates the client account file in `[app-path]/server/data/client/client-accounts.dat`.

   For more information running `server-command` see Section A.1, “Server Commands (server-command)”. See below for a sample batch file.
2. Copy the `client-accounts.dat` to each of the sites running the client software. It should be copied to a shared location accessible by all users running the client (e.g. a file share).

Tip

If you are using Microsoft distributed file system (DFS), you can copy the client account file to the distributed share. DFS will then efficiently distribute the file to all your remote sites.

3. Configure the user client to run with the `--accounts-file "\\fileserver\path\to\client-accounts.dat"` option. Clients at each site should use the accounts file stored locally at that site. The account file location can also be specified in the client's `config.properties` file. For more information on client configuration settings see Section A.5, “User Client Options”.
4. Clients then load the accounts from the file and not directly from the server. The client will only load the accounts from the server if it fails to load the accounts file (i.e. the file does not exist).

Below is an example batch script that can be scheduled to run regularly on your Print-Limit Pro server. This should be scheduled to run whenever your shared accounts are updated (e.g. once a day). You will need to modify the script to reflect where Print-Limit Pro is installed and where the client file should be distributed.

```
REM Batch file to create and distribute the client accounts file

REM Create the client account file
[app-path]\server\bin\win\server-command create-user-client-accounts-file

REM === COPY TO SERVER 1 ===
REM Copy to destination server
REM Create temp file, so clients do not load an incomplete file.
copy /y [app-path]\server\data\client-accounts.dat \\svr1\share\accounts.tmp

REM Rename the temp file the final account file name used by the user clients
move /y \\svr1\share\accounts.tmp \\svr1\share\client-accounts.dat

REM === COPY TO SERVER 2 ===
copy /y [app-path]\server\data\client-accounts.dat \\svr2\share\accounts.tmp
move /y \\svr2\share\accounts.tmp \\svr2\share\client-accounts.dat
```

D.3.1. Known limitations

There is one minor limitation of using the client account file approach. When the account selection popup appears, it will list all the defined accounts (even if the user does not have permission to charge to these accounts). The server still enforces security to ensure that users can only charge to the accounts they have permission to access.

Appendix E. Upgrading From a Previous Version

This appendix describes the Print-Limit Pro standard upgrade procedure. Print-Limit Pro supports upgrades using a simple *install-over-the-top* procedure. We recommend reviewing all steps prior to commencing the upgrade procedure.

E.1. The recommended upgrade procedure

1. Download the Print-Limit Pro installer for your platform. In accordance with best practice we recommend that you archive your install programs just in case you need to reinstall in the future or roll back to a previous version.
2. Download the Print-Limit Pro installer for your platform. In accordance with best practice we recommend that you archive your install programs just in case you need to reinstall in the future or roll back to a previous version. Take some time to read the release notes for this version as they may highlight considerations during upgrades.
3. Schedule approximately 10 minutes downtime. It is suggested to choose a time of day with minimal network activity. If there is a large volume of data in the system (for example if the system has been running for more than a year, or there are more than 5,000 users) the upgrade may take longer. With very large installations it may be appropriate to schedule an hour or more of downtime.
4. Take a point-in-time backup of the data by pressing the **Backup Now** button located under **Options** → **Backups**. This will ensure you have a copy of the important data.
5. As a precaution on very large systems, we recommend backing up the whole Print-Limit Pro directory. Existing overnight backups may have taken care of this task, however take a few moments to grab an up-to-date backup now. For example, create a zip archive of the directory:

   ```
   C:\Program Files\Print-Limit Pro\
   ```

   or the equivalent path on Linux or Mac.
6. Run the installer downloaded in step 1 and install into the *same* location as the existing install.
7. After the install has completed allow a few minutes before accessing the system. The system may need to perform a database upgrade and this will be performed in the background. If you try to access the application while a database upgrade is in progress a message displaying the upgrade status will be displayed. *IMPORTANT: Do not shutdown the application while an upgrade is in progress. Wait for the upgrade to complete.*
8. Although upgrading secondary servers, locally installed user clients and release stations is not strictly required, we strongly recommend doing so. The developers strive to maintain backwards compatibility between versions, so in most cases these external components will continue to function, but to take advantage of new features they must be upgraded. We recommend taking the time now to upgrade secondary servers with the install-over-the-top procedure.
9. After the install is complete, log into the system and perform some tests to ensure all is working as expected and the system is monitoring user activity as expected. Sites running on Novell OES Linux are advised to restart their iPrint Print Manager.

Appendix F. Upgrading from Print-Limit Standard

This appendix describes the process for moving from Print-Limit Standard to Print-Limit Pro, and includes instruction of importing user balances and restriction settings from the old Print-Limit Standard installation.

These instructions assume that Print-Limit Pro will be installed on the same machine as Print-Limit Standard, however the instructions can also be applied when Print-Limit Pro is installed on a new machine.

F.1. Upgrade process

F.1.1. Step 1 - Stop and disable Print-Limit Standard

Firstly the Print-Limit Standard services should be stopped to ensure that they do not interfere with Print-Limit Pro. You should not uninstall Print-Limit Standard at this stage because we need the user database to import user balances into Print-Limit Pro.

To stop and disable the Print-Limit Standard services:

1. Open the Windows services manager (**Start** → **Control Panel** → **Administrative Tools** → **Services**).
2. Find the *Print-Limit Print Charging* service.
3. Right-click on the server and select the **Properties** menu.
4. Change the **Startup Type** to **Disabled**
5. Press the **Stop** button to stop the service.
6. Press **OK** to save the settings changes.

F.1.2. Step 2 - Install Print-Limit Pro

Install Print-Limit Pro as discussed in Chapter 2, *Installation*.

During the setup wizard, it is recommended that the user import settings be set up in the same way as was configured in Print-Limit Standard. For example, if you import users from the full Active Directory domain in Print-Limit Standard, also set this up in Print-Limit Pro.

Check that the users have been imported correctly. To adjust the user import settings and re-perform the user synchronization process, go to the **Options** → **User/Group Sync** screen. This is similar to the *Tune-up* function in Print-Limit Standard.

Once installed it is recommended that the groups are set up in the same way as in Print-Limit Standard. Groups are used to determine the default settings for new users and also how quotas are allocated. For more information on groups see Section 6.1, “Groups in Print-Limit Pro”.

F.1.3. Step 3 - Configure and test printers

The next step is to set up the printers in Print-Limit Pro to reflect the require page costs and print restrictions. To do this:

1. Navigate to the **Printers** section.
2. Select the printer to adjust by clicking on the printer name.
3. Enter the cost and filter settings.
4. Press the **OK** or **Apply** buttons to save the changes.

For a detailed explanation of setting printer costs and restrictions, see Chapter 7, *Advanced Printer Management*.

Tip

If all your printers are configured with similar costs and filters then the settings can be copied from one printer to the other printers. This is discussed in Section 7.3, “Copying Printer Settings”.

Tip

It is recommended that the administrator set up the `[template printer]`. This printer is used as a template when new printers are added to the system. The template printer is discussed in detail in Section 7.2, “The Template Printer”.

To ensure that the printers are setup correctly, perform a test print to one of the configured printers. Once printed, check the print log (**Printers** → **Print Log**) that the job was recorded and the correct cost calculated.

F.1.4. Step 4 - Import the existing User Balances

In Professional (Client Billing) installations, this step can be optional because shared accounts are used instead of user account balances. If you do not wish to import user balances, skip to the next step.

Moving the user balances and restricted status from Print-Limit Standard to Print-Limit Pro is a simple process. If the server is running Windows then:

1. Navigate to the **Users** section.
2. Click the **Batch import ...** action (on the left).
3. Press the **Browse** and locate the Print-Limit Standard user database (`PCUserDB.mdb`). This is typically located at: `C:\Program Files\Print-Limit\Database\PCUserDB.mdb`
4. Press the **Import** button to start the import process.
5. Upon successful completion, the number of users updated and created will be displayed.
6. Perform some checks of the user balances and restricted statuses to ensure they are set to the values from Print-Limit Standard.

If the Print-Limit Pro server is not running on Windows, the Print-Limit Standard database converter can be run manually on a Windows system, and the resulting text file can then be imported in a process similar to the above. To convert the Print-Limit Standard user database manually:

1. Copy the `[app-path]/server/bin/win/PCQuotaExport.exe` file from the server (running the non-windows OS), to the Windows machine running Print-Limit Standard. Copy the exporter to the Print-Limit Standard database directory (usually `c:\Program Files\Print-Limit\Database`).
2. Open the command prompt, by running `cmd.exe` from **Start** → **Run**.
3. Change to the Print-Limit Standard database directory. e.g.

```
cd "c:\Program Files\Print-Limit\Database"
```

4. Run the converter, with the location of the `PCUserDB.mdb` as the argument. For example:

```
PCQuotaExport.exe "PCUserDB.mdb" > user-export.txt
```

   If running the exporter from a different directory to the database, the full path to the database should be provided.

5. The above command creates a text file called `user-export.txt` that contains the user data from Print-Limit Standard. The file can be opened in a text editor to review the contents.
6. The file can then be imported into Print-Limit Pro. First log in to Print-Limit Pro.
7. Navigate to the **Users** section.
8. Click the **Batch import ...** action (on the left).
9. Press the **Browse** and locate the `user-export.txt` file, created in the above step.
10. Press the **Import** button to start the import process.
11. Upon successful completion, the number of users updated and created will be displayed.
12. Perform some checks of the user balances and restricted statuses to ensure they are set to the values from Print-Limit Standard.

F.1.5. Step 4b - Import the existing Accounts

Moving the accounts and their settings from Print-Limit Standard to Print-Limit Pro is a simple process, that is described in detail below. This is particularly important in a Professional (Client Billing) installation where shared accounts are used to charge print jobs to client accounts. If this is not important in your environment then please skip this step.

Tip

When accounts are imported they inherit the access control settings from the `Template Account`. By default the `Template Account` is configured to allow all users access to the account. If you do not want all users to have access the imported accounts, change the security settings on the `Template Account` before importing.

To import the accounts when the server is running Windows then:

1. Navigate to the **Accounts** section.
2. Click the **Batch import ...** action (on the left).
3. Press the **Browse** and locate the Print-Limit Standard database (`PCUserDB.mdb`). This is typically located at: `C:\Program Files\Print-Limit\Database\PCUserDB.mdb`. This database contains all of the accounts.
4. Press the **Import** button to start the import process.
5. Upon successful completion, the number of users updated and created will be displayed.
6. Perform some checks of the accounts and settings to ensure they are set to the values from Print-Limit Standard.

If the Print-Limit Pro server is not running on Windows, the Print-Limit Standard database converter can be run manually on a Windows system, and the resulting text file can then be imported in a process similar to the above. To convert the Print-Limit Standard user database manually:

1. Copy the `[app-path]/server/bin/win/PCCBAccountExport.exe` file from the server (running the non-windows OS), to the Windows machine running Print-Limit Standard. Copy the exporter to the Print-Limit Standard database directory (usually `c:\Program Files\Print-Limit\Database`).
2. Open the command prompt, by running `cmd.exe` from **Start** → **Run**.
3. Change to the Print-Limit Standard database directory. e.g.

```
cd "c:\Program Files\Print-Limit\Database"
```

4. Run the converter, with the location of the `PCUserDB.mdb` as the argument. For example:

```
PCCBAccountExport.exe "PCUserDB.mdb" > account-export.txt
```

If running the exporter from a different directory to the database, the full path to the database should be provided.

5. The above command creates a text file called `account-export.txt` that contains the user data from Print-Limit Standard. The file can be opened in a text editor to review the contents.
6. The file can then be imported into Print-Limit Pro. First log in to Print-Limit Pro.
7. Navigate to the **Accounts** section.
8. Click the **Batch import ...** action (on the left).
9. Press the **Browse** and locate the `account-export.txt` file, created in the above step.
10. Press the **Import** button to start the import process.
11. Upon successful completion, the number of accounts updated and created will be displayed.
12. Perform some checks of the accounts and settings to ensure they are set to the values from the previous version.

F.1.6. Step 5 - Upgrade client software

The old Print-Limit Standard client software is not compatible with Print-Limit Pro. The old client software must be uninstalled off all workstations and the new client software deployed. The zero-install deployment method can greatly assist with this process. More information on the client deployment is detailed in Section 5.2, “User Client”.

Note: It is not 100% accurate to claim that the old client software must be removed. Once the old server-side software is disabled, the old client will sit in an inactive state and do no harm. Having said that however, it will consume some system resources on the workstations and hence it is generally recommended that it be uninstalled.

F.1.7. Step 6 - Optionally uninstall Print-Limit Standard

Once the Print-Limit Pro installation is completed and tested you can optionally uninstall Print-Limit Standard. If you would like to view historical print data then we recommend keeping the old application installed so you can view the historical data. If this is not important then the application can be uninstalled.

To uninstall:

1. On the Windows server running Print-Limit Standard, go to: **Start** → **Control Panel** → **Add or Remove Programs**).
2. Find and select Print-Limit Standard in the list of installed programs.
3. Click the **Remove** button to start the uninstall process.

Appendix G. Example User Information Sheets

Usually administrators are responsible for educating users about policy or system changes when Print-Limit Pro is deployed on their network. Providing the right information and guidelines for users is important for the success of any new system.

This chapter contains examples of information sheets which could be distributed to users. The purpose of these information sheets is to assist the administrator in providing important information about the new system and how to use it. These examples can act as templates or starting points for your own information sheets.

We suggest you enhance the information sheets to include information such as:

- Details of your organization's printing policy, such as the standard cost per page and whether or not more printing balance may be added after the user has run out.
- Location of the printers.
- How to report problems or receive assistance, such as refunding a failed print job.
- How to contact the help desk.
- How to provide feedback about the new system.

G.1. Example 1: Printing with the popup confirmation window

New software to manage printing costs has been installed on the network. To allow effective printing please make sure you understand the following points:

G.1.1. Popup Confirmation Dialog

After sending a print job a popup dialog will appear and ask you to confirm the details. Click **Print** to confirm the job and agree to the cost. Otherwise, click **Cancel** if you no longer wish to print the job.

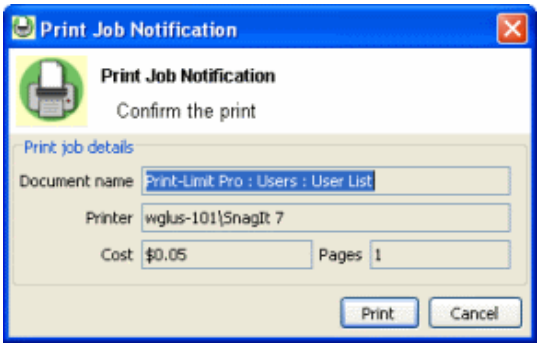


Figure G.1. Client Popup Confirmation Window

Note: Large documents might take a while to display the number of pages and cost.

G.1.2. The Printing Balance Window

After logging on to a workstation you will see a window showing your printing balance.

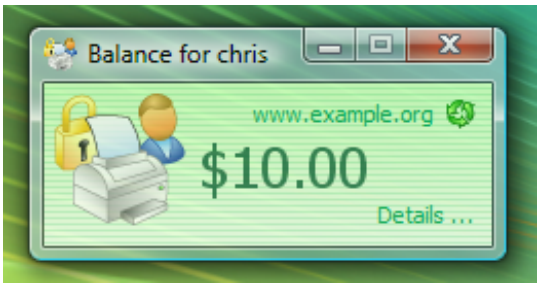


Figure G.2. Printing balance window showing $10.00 of printing balance

If the balance window is not visible (or if you have closed or minimized it) click the icon in your system tray to show it again.

Figure G.3. Printing balance icon in the system tray

When you confirm a print job by pressing **Print** in the popup dialog the cost will be deducted from your printing balance.

G.1.3. Resolving Problems

If the popup window does not appear or the icon is missing from your system tray, the print control system may not be active and printing will be denied. Please try restarting your system, or ask for assistance if problems continue.

G.1.4. Printing Denied Message

If you do not have enough printing balance for a job you will see a **Printing Denied** message, and your document will not be printed.

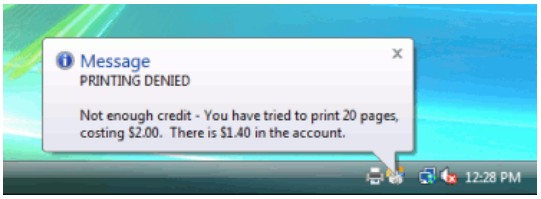

Message
PRINTING DENIED
Not enough credit - You have tried to print 20 pages, costing $2.00. There is $1.40 in the account.
12:28 PM

Figure G.4. Printing denied message

G.2. Example 2: Printing with shared accounts (for staff)

New software to manage printing costs has been installed on the network. The system will allow the college to track printing expenses according to the individual, faculty or department. To allow effective printing please make sure you understand the following points:

G.2.1. Shared Account Selection Popup Window

After sending a print job a popup dialog will appear and ask you to confirm the details. The print job may be charged to your personal account (using your personal printing balance), or to a shared account (a faculty, using the faculty budget). After choosing an account to charge, click **Print** to confirm the job and agree to the cost. Otherwise, click **Cancel** if you no longer wish to print the job.

Your personal account should be selected when printing non-faculty related documents. For example:

- Printing your personal bank or phone statement.
- Occasional personal use of a photo printer.

A shared account should be selected for faculty printing. For example:

- Student handouts.
- Student reports.
- Course syllabus.
- Class lists.

Selecting the right faculty account from the drop-down list is important. Different staff members will have access to different faculty accounts. If an account that you require is missing from the list, please contact the system administrator. Please note that the use of faculty accounts is monitored and faculty heads are provided with printing reports.

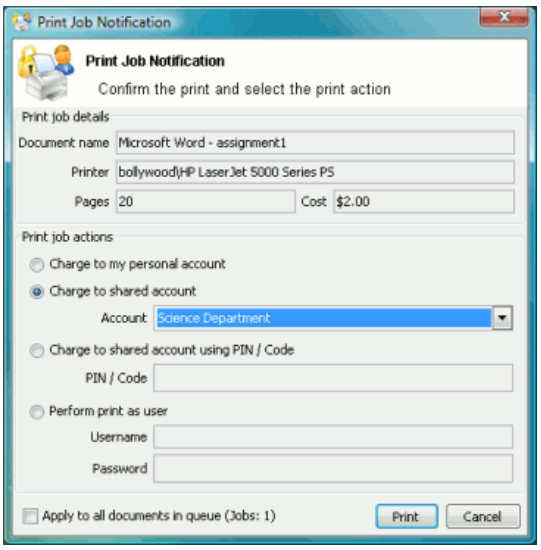


Figure G.5. Shared Account Selection Popup

Note: Large documents might take a while to display the number of pages and cost.

G.2.2. Resolving Problems

If the popup window does not appear or the icon is missing from your system tray, the print control system may not be active and printing will be denied. Please try restarting your system, or contact the network administrator if problems continue.

Figure G.6. Printing balance icon in the system tray

G.2.3. Printing Denied Message

If you do not have enough printing balance for a job you will see a **Printing Denied** message, and your document will not be printed.

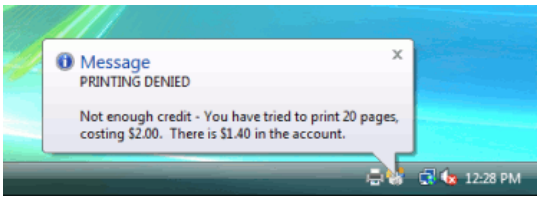

Message
PRINTING DENIED
Not enough credit - You have tried to print 20 pages, costing $2.00. There is $1.40 in the account.
12:28 PM

Figure G.7. Printing denied message

G.3. Example 3: Printing using a release station

The printing procedure has been changed on the network. Now when you print a job, it will not print it immediately, but instead will be held in a queue. You will need to attend a release station and release the job to print. This new system ensures that you are present and ready to collect your job. Please follow the steps listed below:

1. Select Print from your application (e.g. **File** → **Print...**)
2. Walk up to the release station located next to the printer.
3. Log in to the release station using your network username and password.

Figure G.8. Login screen

4. After login the system will display a list of print jobs. Search for your document by looking for your user name or document name.

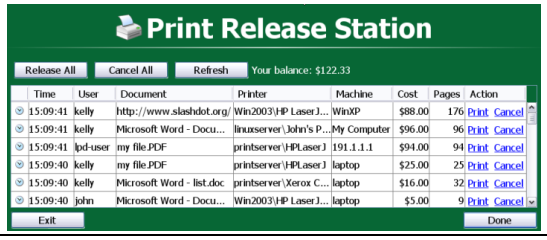

Print Release Station
Release All
Cancel All
Refresh
Your balance: $122.33
Time User Document Printer Machine Cost Pages Action
15:09:41 kelly http://www.slashdot.org/ Win2003\HP LaserJ... WinXP $88.00 176 Print Cancel
15:09:41 kelly Microsoft Word - Docu... linuxserver\John's P... My Computer $96.00 96 Print Cancel
15:09:41 lpd-user my file.PDF printserver\HPLaserJ 191.1.1.1 $94.00 94 Print Cancel
15:09:40 kelly my file.PDF printserver\HPLaserJ laptop $25.00 25 Print Cancel
15:09:40 kelly Microsoft Word - list.doc printserver\Xerox C... laptop $16.00 32 Print Cancel
15:09:40 john Microsoft Word - Docu... Win2003\HP LaserJ... laptop $5.00 9 Print Cancel
Exit
Done

Figure G.9. Print jobs waiting in a release station

Note: If you can't find your print job it may have 'timed out'. Print jobs are held by the release station for 30 minutes. If they have not been released after this time they will be deleted.

5. Check the cost and details of the job.
6. Click **Print** to release the job. Please note that it may take up to 30 seconds for the printer to warm up after clicking **Print**.

G.4. Example 4: Refunding a print job (for staff)

Selected staff members have been granted access to refund print jobs in the new print control system.

Reasons for refunding a print job may include:

- There was a paper jam or the document failed to print correctly.
- The document failed to print at an acceptable quality.

As a staff member you will need to make an assessment about whether or not to issue a refund. A print job may be fully or partially refunded. A full refund is the more common scenario.

G.4.1. Refund

To issue a refund:

- Log in to the Print-Limit Pro administration interface at `http://servername:9191/admin` using your network username and password.
- Find the user to refund from the **Users** tab by entering their username in the **Quick find** box or clicking on their username.
- Click on the **Job Log** tab. This will list recent print jobs printed by the user, with the most recent at the top.
- Look for the print job that needs refunding and click the **refund** link next to it.

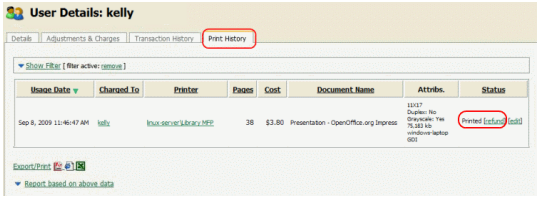


Figure G.10. Job Log

- Enter a comment and press **OK**.

Figure G.11. Refunding print job

G.4.2. Action Refund Requests

Users can send refund requests via user web interface. More informantion about this is given in Section 7.17, “Refunding Print Jobs”.

To action a refund request:

- Log in to the Print-Limit Pro administration interface at `http://servername:9191/admin` using your network username and password.
- Navigate to **Printers** → **Refunds**.
- Locate the user's refund request.
- To approve/reject click the **approve**/ **reject** link.

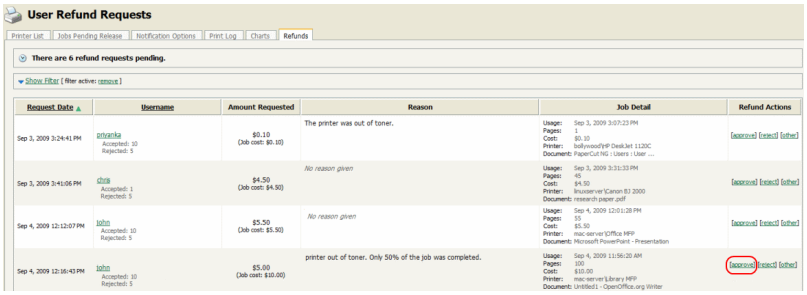


Figure G.12. Approving a refund request from the Refunds tab in the admin interface.

- To get an overview of user's refund requests click the **other** link. Use this to edit the refund amount and write a comment.

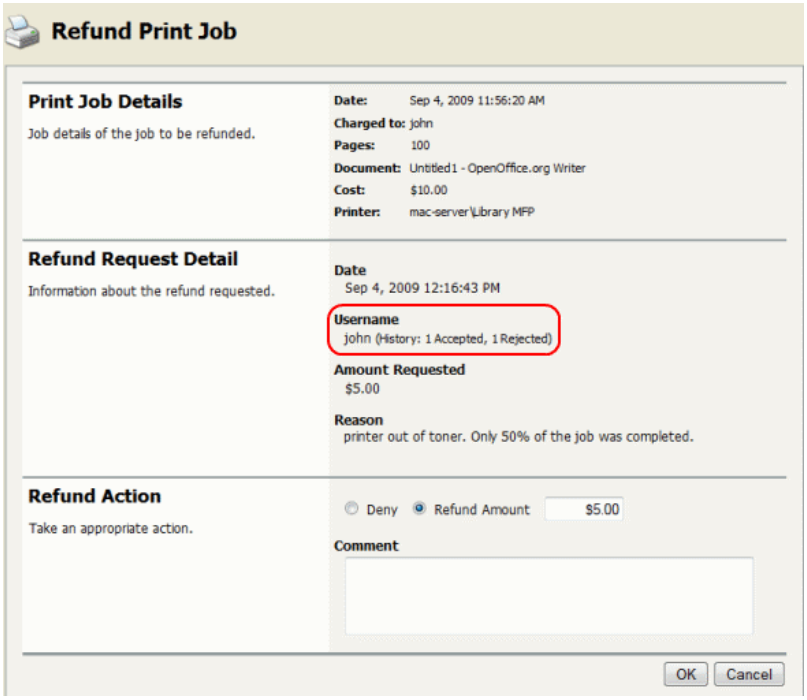


Figure G.13. Overview of user's refund request

G.5. Example 5: Adding credit using a PrintCard

New software to manage printing costs has been installed on the network. Without sufficient printing credit in your account printing will be denied. To add more credit you can buy PrintCards from the nominated venues around the college. Each card is a voucher or coupon with a unique number. Please make sure your card number is kept secret until use.

To add credit to your account using a card:

- Log in to a computer. Soon after login, your printing balance window will appear.
- Click the **Details ...** link on the balance window.

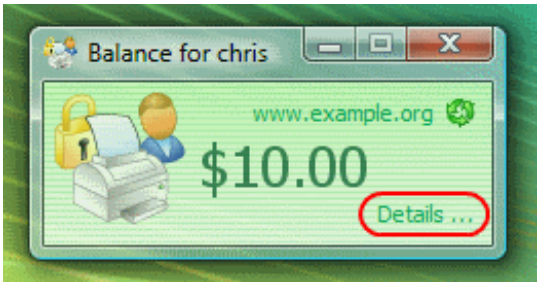


Figure G.14. Balance window showing the Details link

- A web page will open requesting your network username and password.
- After logging in click the **Redeem Card** link from the left menu.

- Enter the number from the card. It should be entered exactly as shown on the card including any dashes (-).

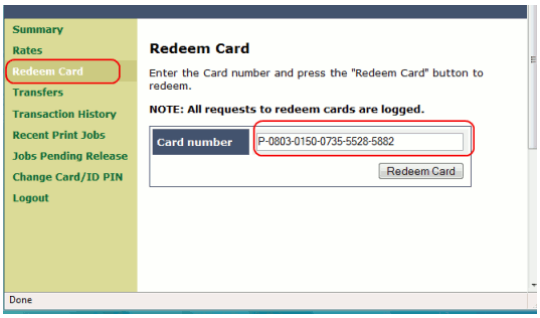


Figure G.15. Redeem Card page

- Click **Redeem Card**. The value of the card will immediately be added to your printing balance.
- Click **Summary** from the left menu and check your balance to confirm the card's value has been added to your account.

Note: The card is valid for a single usage only. The card should be recycled or disposed of after use.

G.6. Example 6: Printing from a wireless network or laptop (Web Print)

The Web Print system allows students to print to college printers from their own laptops without the need to install drivers. It works by offering a facility to upload documents in formats such as PDF, DOC etc using a standard web browser. You access Web print from the print system's User Web Tools.

The system can print documents that have the following file formats:

Application	File Format(s)
Adobe Reader 9	PDF
Microsoft Office Excel 2007	XLS, XLSX, etc.
Microsoft Office PowerPoint 2007	PPT, PPTX, etc.
Microsoft Office Word 2007	DOC, DOCX, etc.
Microsoft XPS Document Writer	XPS

Table G.1. Web Print Supported Applications and File Formats

Free PDF printers are available for download from several websites such as PDF Creator [http://sourceforge.net/projects/pdfcreator/files/]. Printing from any application using the normal print function will produce a PDF document that can be uploaded using this system.

All Vista and higher versions of Microsoft Operating Systems have a virtual XPS printer that works similarly to the PDF printers.

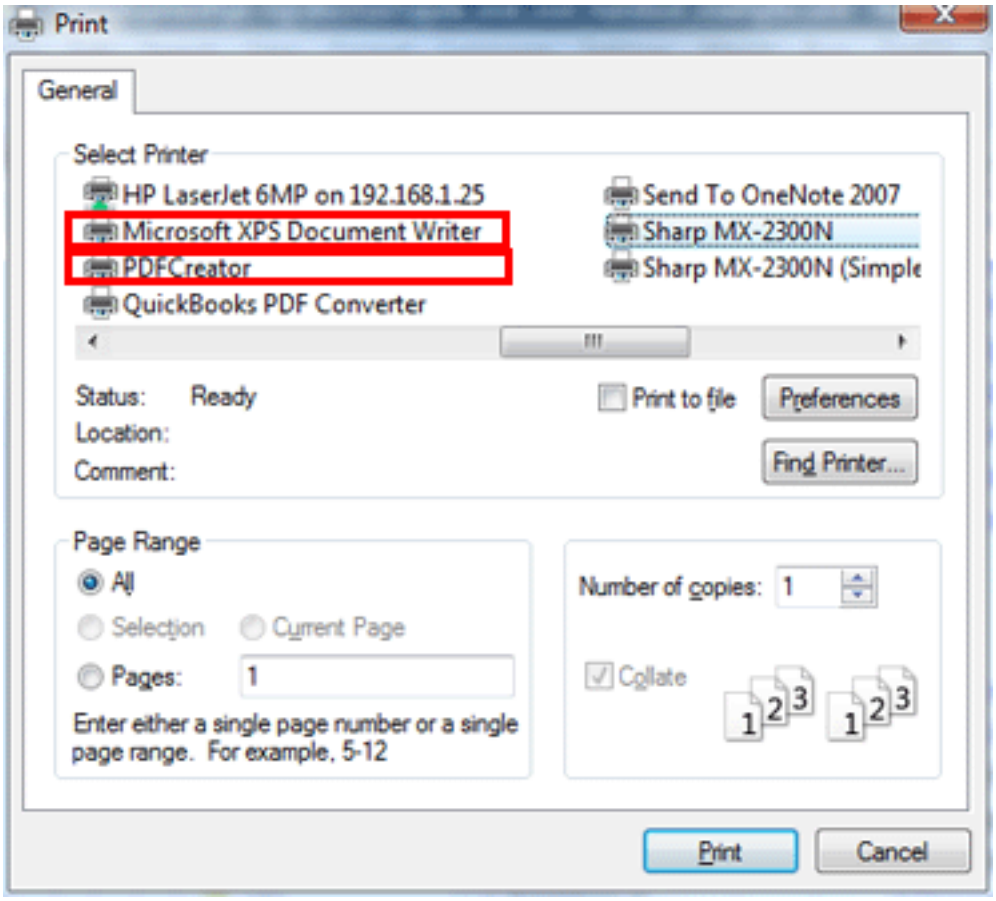


Figure G.16. Printing using PDF Creator or XPS Document Writer

To print a document:

1. Open your browser to `https://[server-name]:9192/user` and log in using you network username and password. Select the **Web Print** link in the navigation menu.

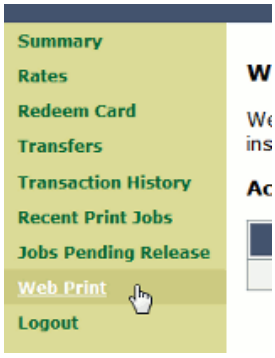


Figure G.17. Web Print link

2. The front page contains a list of your active and recently submitted Web Print jobs. At first the list will be blank. Later the list will show the status of submitted jobs.

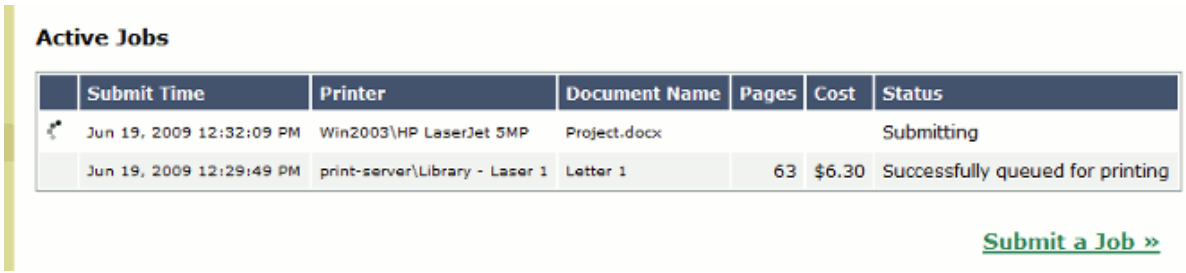


Figure G.18. Web Print front page showing active jobs

You may see a message at the top of the Active Jobs page with other information that you may need to know to use Web Print.

Web Print
Web Print is a service to enable printing for laptop, wireless and unauthenticated users without the need to install print drivers.
Active Jobs

Figure G.19. Instructions for using the system

3. Click **Submit a Job** to start the Web Print wizard.
4. The first step of the Web Print wizard is selecting a printer where your job will be printed.

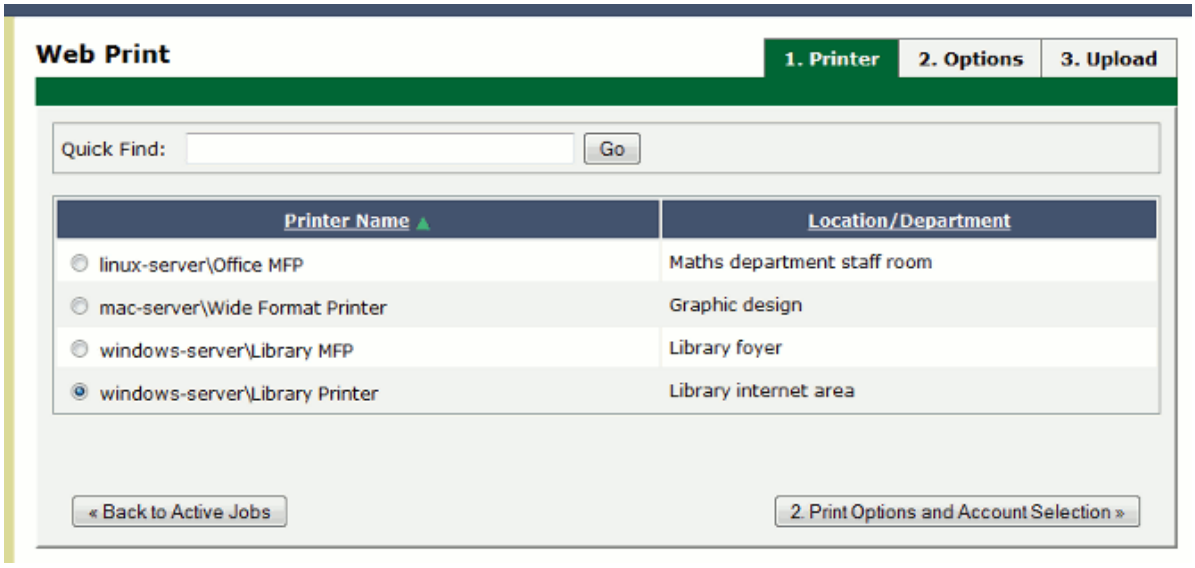


Figure G.20. Choosing the printer

Instead of the Printer List you may see a clickable map or other graphical representation of the printers that are available.

5. Select the number of copies to print. (Users that have permission to print to shared accounts will see additional options on this page.)

Figure G.21. Enter the number of copies

6. After selecting the print options and/or account selection settings, the third and final step in the Web Print wizard is to upload a document to print. This page lists the applications and associated file extensions that are supported. Once a document has been selected and **Upload & Complete** is pressed the file will begin uploading to the server.

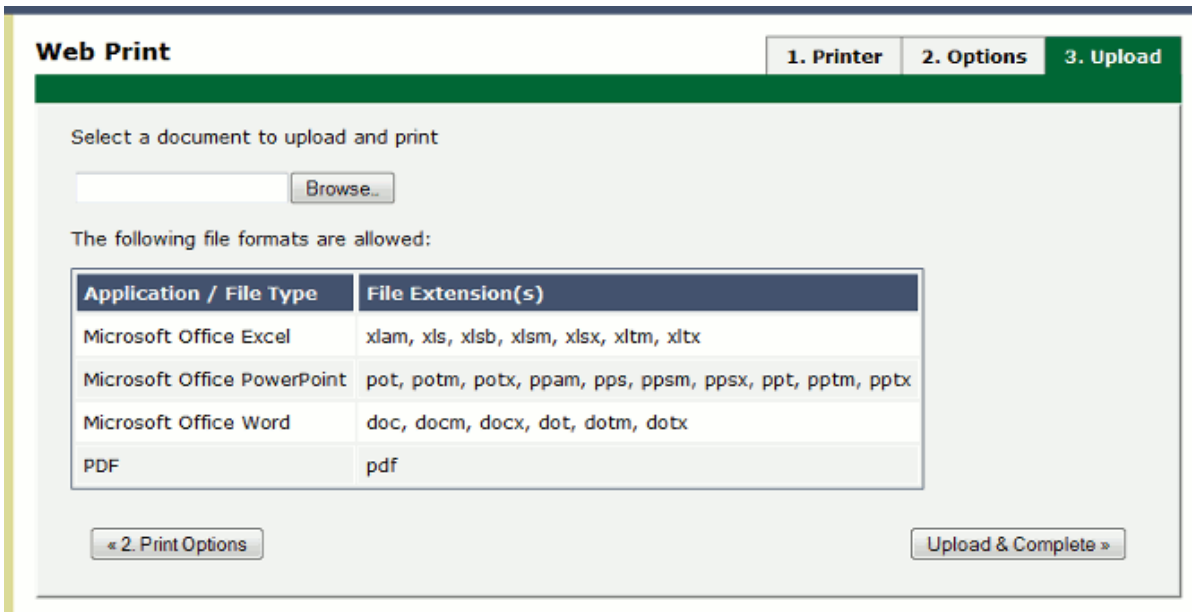


Figure G.22. Upload a document

7. Once the document upload is complete you will be returned to the front Web Print page. The table now displays the status of your job. Jobs may be queued during times of high load. The status will change to indicate the progress of the job from rendering to printing, and job details such as cost and number of pages will be populated when known. You may stay at this page to track the status of the job or navigate away or close the browser. The job will not be affected.